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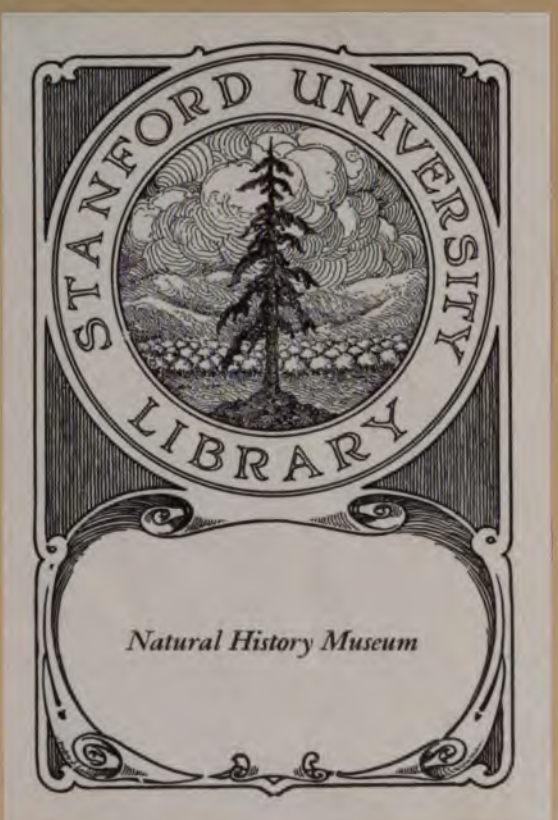
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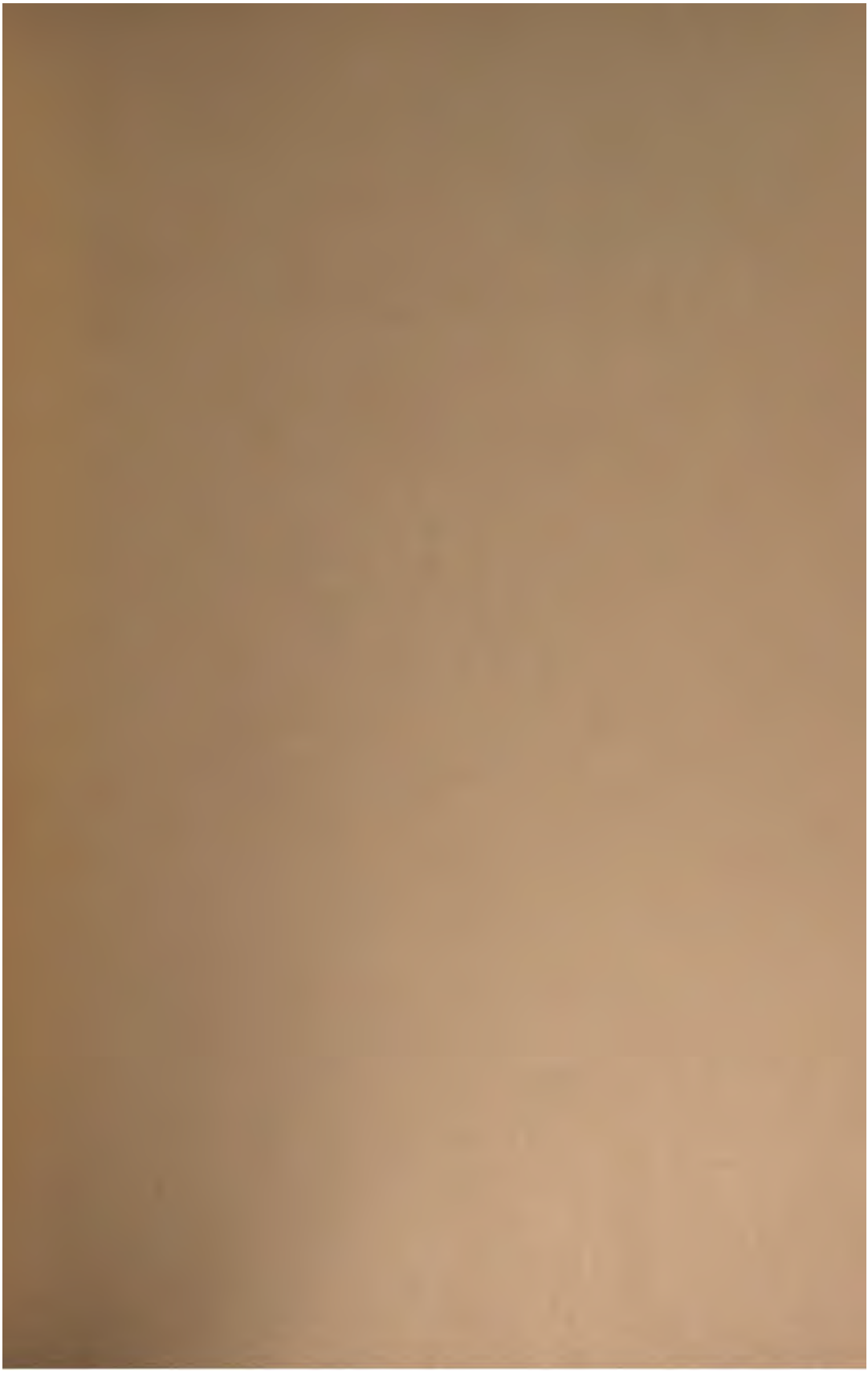

# RECORDS

OF THE

# Albany Museum.

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## VOL. I.

(With 11 Plates.)

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## CORRECTIONS AND ADDITIONS.

Page 48 (1st line) for "*hypoxidioidis*" read "*hypoxidioides.*"

„ „ (6th line) for "fairly" read "faintly."

„ 49 (1st line) for "*Huttonii*" read "*Huttoniae.*"

„ „ for "*Dioscorea Tysonii*, Schönl., n. sp." read "*D. Browni*, Schinz."

„ 50 (4th line from bottom) for "petiole" read "pedicel."

„ 63 after "*Crassula impressa*, N.E. Br." insert "*Cr. Schmidtii*, Reg."

„ 64 after "*Cr. quadrangularis*, Schönl." insert "*Cr. Aitoni*, Britt. et Bak. fil. (=Cr. cordata [Dryand. in] Ait. Hort. Kew. I, 396 (1789), non Thunb.) Journ. of Bot., Dec. 1887, p. 480."

„ 65 for "*Cr. deceptor*" read "Cr. deceptrix."

„ 67 leave out "*Cr. remota*, Schönl."

„ 109 for "*Torymus Mesembyanthemumi*" read "*Torymus mesembrianthemi.*"

„ 110 for "*Rethus*" read "*Zethus.*"

„ 113 (21st line) for "Rees" read "Nees."

„ 117 (heading) for "South African Grasses" read "New and little known plants."

„ 120 (13th line from bottom) for "1.5 mm." read "1.5 cm."

„ 124 (6th line) for "*albimarginatum*" read "*albomarginatum.*"

„ 177, 178 for "*Saurosternon*" read "*Saurosternum.*"

„ 235—the description of *Brachyropalum nigriceps*, Cam. was by some error printed amongst the *Ichneumonidae* instead of along with the *Braconidae.*

, 285 for "*A. Bowiei*" read "*A. Bowiea.*"

, 306 for "*Adontothynnus*" read "*Odontothynnus.*"

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# Records of the . . Albany Museum.

## VOL. I.

**PART I CONTAINING:**

1.—On the Skull of a true Lizard *(Paliguana Whitei)*, from the Triassic Beds of South Africa, by Dr. R. Broom.

2.—On the remains of *Lystrosaurus* in the Albany Museum, by Dr. R. Broom.

3.—On the remains of *Procolophon* in the Albany Museum, by Dr. R. Broom.

4.—On some Bushman and Hottentot Pottery in the collection of the Albany Museum, by Dr. S. Schönland.

5.—On some South African Species of *Aloe* (with descriptions of two new species), by Dr. S. Schönland.

6.—On some new and some imperfectly known Species of South African plants, by Dr. S. Schönland.

7.—List of South African Species of *Crassula* described during recent years, by Dr. S. Schönland.

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**On the skull of a true Lizard (*Paliguana Whitei*) from the Triassic beds of South Africa.**—By R. BROOM, M.D., B.Sc., C.M.Z.S.

For many years there has been in the collection of the Albany Museum a small reptilian skull, which had been sent by the late Mr. D. White from Donnybrook, between Tarkastad and Queenstown. Through having originally been erroneously labelled *Procolophon minor*, it has apparently escaped the observation of recent students.

When carefully examined, the specimen proves to be, not only a new form, but one of exceptional interest. Hitherto very few true lizards have been found further back than the Tertiary deposits, and no undoubted Lacertilian has yet been found in rocks earlier than the Jurassic. Lizard-like reptiles have indeed been found in the Triassic rocks both of S. Africa and of Scotland, as *Saurosternum* and *Telerpeton*, but these are now generally regarded as being Rhynchocephalians. Both genera, however, are imperfectly known and it is possible that *Telerpeton* at least is a true Lacertilian. This was the opinion of Huxley, and in his restoration of *Telerpeton* he figures the quadrate as having no attachment with the jugal. In the figure of the underside of the skull of *Saurosternum Griesbachii* given by Owen in his catalogue of S. African reptiles, the quadrate is shown to be fixed, but as

the specimen is somewhat crushed, and as Owen gives no description of it, it is impossible to place much weight on the figure alone.

The little skull which is in the Albany Museum is in fairly good preservation. Though the lower jaw and the maxillaries are badly crushed and the premaxillaries lost, fortunately the postorbital region is well preserved and shows the little fossil to have had a movable quadrate as in the modern lizards.

In general the skull bears considerable resemblance to that of the Iguanas. The orbits are unusually large and the temporal fossae are rather small and almost as broad as long. The sutures are for the most part fairly distinct.

The frontals are moderately flat, and in width about one-third the width of the skull. The suture between them and the parietal is about opposite to the parietal foramen. The suture between the frontal and the post-frontal passes almost directly backwards from the inner margin of the orbit, and that dividing the frontal from the prefrontal almostly directly forwards.

The parietals, which appear to have been distinct, are together about as wide as the frontals, and a little more than half as long. Posteriorly they have processes passing outwards and slightly backwards, and no doubt articulating with the squamosals. These latter bones, however, are lost, though the impression of that of the right side still remains.

A large oval parietal foramen lies in the suture between the parietals and frontals.

The prefrontal so far as preserved does not differ from the ordinary lacertilian type.

The maxillaries are too much crushed and imperfect to admit of description. They have however been moderate sized bones, and lie almost entirely in front of the orbit—only a slender process being sent back under the orbit. The only maxillary teeth shown are detached. They are fairly long and pointed, and it is moderately certain the dentition has been pleurodont.

The jugal is a long slender bone extending under the whole of the orbit. Posteriorly it widens out and passing upwards forms with the postfrontal the postorbital arch. As in *Agama* there is a small process directed towards the lower end of the quadrate but there is no trace of a quadrato-jugal. The tiny bone-fragment shown in the figure between the jugal and the quadrate is apparently a fragment of the crushed lower jaw.

The postfrontal is a large bone which forms most of the post-orbital arch. It articulates with both the frontal and parietal, and on passing outwards gives off, as in typical lizards, a posterior branch, which forms in part the temporal arch, and an inferior branch which unites with the jugal.

The bone which has united the postfrontal with the upper end of the quadrate is missing, but its impression remains. It is the element which is regarded by most authors as the squamosal, but which I am rather inclined with Baur to regard as the supra-temporal.

The squamosal which has lain between the upper end of the quadrate and the parietal has been comparatively small, as in lizards generally.

The quadrate is very large and thoroughly lacertilian in structure. Its concave surface looks outwards and backwards.

The lower jaws are very much crushed; as in modern lizards they have been loosely attached at the symphysis. The quadrate appears to have formed a deeper concavity in the articular than is usual in modern lizards.

The palatal bones are crushed and displaced apparently, and have not been cleared of matrix.

So far as it is possible to judge from the skull, the affinities of the small lizard seem to be more with the American Iguanas than with other modern lizards. I have, therefore, proposed for it the name *Paliguana Whitei*, after the discoverer of the specimen.

**Fig 1**, Plate 1 :—Side view of skull of *Paliguana Whitei*. x 2.
**Fig 2**, ,, :—Top views ,, ,, ,, x 2.

## On the remains of *Lystrosaurus*, in the Albany Museum.—

By R. BROOM, M.D., B.Sc., C.M.Z.S.

As the name *Ptychognathus*, proposed by Owen in 1859 for those peculiarly specialised Dicynodont reptiles with long decurved snouts, has been pre-occupied by Stimpson for a crustacean genus, it becomes necessary to adopt the name proposed by Cope in describing a species in 1870, viz., *Lystrosaurus*.

In the Albany Museum there are a number of interesting skulls and a few other fragmentary remains.

*Lystrosaurus latirostris* (OWEN).

No. 1. A fairly complete skull, with lower jaw, of an animal slightly smaller than the type. A considerable part of the premaxillary is weathered away, but the other bones of the top of the head are well shown. The nasals form a median suture of nearly an inch, behind the upper end of the median process of the premaxillary. Behind the frontals and the front of the parietal foramen is the median preparietal. Between the frontals and the bones which have usually been regarded as postfrontals are interposed a very distinct pair of narrow bones. These are very similar to those figured by Seeley in the skull of *Mochlorhinus platyceps* (Ann. and Mag. Nat. Hist., Feb. 1898), and regarded by him as postorbitals. But as it has been customary to regard the anterior and upper of the two bones behind the orbit, as the postfrontal and the posterior, the postorbital, we must look upon the narrow bone as the true postfrontal—apparently lost in the other Dicynodonts—and the large bone which has hitherto been looked upon as the postfrontal as really the postorbital. The specimen has been split transversely, and there has been revealed much of the internal structure of the skull. The parietals are seen to form lateral walls to the brain cavity, and in front they are seen articulating with the columella. A section of the true vomer is seen with the palatine on either side, and in contact posteriorly with the large median sphenoid. In the mandible the dentary is much exfoliated but the surangular and angular are well shown with between them and the dentary a large oval foramen. The angular has a large downward and inward process, as in Udenodon. The articular is a fairly large element.

Brakriver. Pres. by MR. R. HARVEY.

No. 2. A badly weathered skull, which has lost the front of the snout, and practically all the bones of the frontal, parietal and occipital regions. It has been split transversely in the plane of the pterygoids, and the larger fragment again vertically near the middle line. The first fracture shows thoroughly the structure of

the pterygoids and their relations to the vomer, the palatines, and to the sphenoid. The second fracture shows the articulation of the large median plate of the premaxillary with the vomer: and that of the vomer with the sphenoid. The right epipterygoid is also fairly well shown.

Brakriver. Pres. by MR. R. HARVEY.

No. 3. A crushed skull with lower jaw. The skull above is much weathered, and much of the matrix remains. Inferiorly the specimen has been transversely fractured and the whole of the palate has been most beautifully displayed. In the sphenoid a very short distance behind the suture with the pterygoids are a pair of small round foramina, which may be the foramina for the internal carotids. The relations of the squamosal, exoccipital and articular to the quadrate are well shown, and the little bone which I regard as probably the tympanic, is very distinctly seen. Above it and lying in the large oval foramen which it forms, are seen two ossicles, one behind the supposed tympanic and one in front. As the specimen is somewhat crushed and the ossicles probably displaced, it will perhaps be better not to give a detailed description of the appearances. The lower jaw is well displayed.

Brakriver. Pres. by MR. R. HARVEY.

No. 4. A fairly complete skull of an immature individual. The lower jaw is almost entirely gone, and the surfaces of the cranial bones considerably weathered. The front of the palate is fairly well shown, and the greater part of the occiput. Both the median preparietal and interparietals are well seen.

Brakriver. Pres. by. MR. R. HARVEY.

No. 5. An imperfect skull of a small animal. The snout is fairly well shown, but the frontal region is covered with matrix.

Brakriver, Pres. by MR. R. HARVEY.

No. 6. The median portion of a moderate sized skull badly crushed. The palate is fairly well seen, and the roots of the two canines. Above portions of the premaxillary, nasals, frontals, prefrontals, preparietal, parietals, interparietal, and occipitals.

Brakriver. Pres. by MR. R. HARVEY.

No. 7. A slab showing on the one side portions of most of the bones of the side of a small skull, including those of the mandible —considerably weathered; and on the other side four imperfect ribs.

Brakriver. Pres. by MR. R. HARVEY.

No. 8. Slab with the parietals, interparietal, and right post-orbital of a very small skull: and also portions of 5 ribs.

Brakriver. Pres. by MR. R. HARVEY.

No. 9. a, b, c, d, e. Five small slabs with portions of ribs and vertebrae from the same locality as the above skulls, and probably belonging to the same individual as one or other of the skulls.

Brakriver. Pres. by MR. R. HARVEY.

*Lystrosaurus declivis* (OWEN).

No. 10. An almost complete skull of an individual probably somewhat immature. In all its characters it agrees closely with the type skull. The lower jaw is in position but it is largely covered by matrix. The preparietal is very similar to that in *L. latirostris*.

Loc. unknown. Pres. by MR. W. J. COLEMAN.

*Lystrosaurus McCaigi*, Seeley.

No. 11. This magnificent skull which was developed under Prof. Seeley's direction is referred to by him in his paper "On the Skull of *Mochlorhinus platyceps*," (Ann. and Mag. Nat. Hist., Feb. 1898), but I am not aware that the skull has been either described or figured. It is by far the largest of the known species of Lystrosaurus—the skull measuring from the front of the maxillary to the back of the parietal no less than 390 m.m., and the orbit being 100 m.m. across. It differs from the species described by Owen, mainly in being much narrower proportionally and in having very large supraorbital crests. The snout is moderately straight, and has a median ridge running up it, formed almost entirely by the premaxillary. The large supraorbital crests are formed almost entirely by the prefrontals. Between the crests there is a small median crest probably formed by the frontals, and slightly in front of the large crest and considerably internal to them are a pair of small crests probably also formed by the pre-

frontals. The parietals with the postorbitals form two prominent parallel ridges. The occipital region is much narrower, and the inferior occipital processes much more approximated than with the other known species. The palate is most beautifully displayed, but the sutures of the bones not very distinctly seen. The large median ridge in thefront of the palate is seen to be formed almost entirely by the premaxillary. It is posterior, and it articulates with the median vomer. There is a distinct and almost complete secondary palate formed by the maxillaries and the palatines.

(Plate 1, Fig. 3, represents the right side of the skull with the supraorbital crest restored from that of the left side. ½ nat. size.)

Elandsberg, near Cradock. Pres. by MR. MCCAIG.

*Lystrosaurus platyceps* (Seeley).

No. 12. This is the skull which has been described by Prof. Seeley (Ann. and Mag. Nat. Hist., Feb. 1898), under the name of *Mochlorhinus platyceps*. In many respects it agrees very closely with *Lystrosaurus McCaigi*, and it is just possible that the differences may be sexual or due to this smaller skull being immature. I am inclined, however, to regard the two species as distinct. I cannot agree with Prof. Seeley in regarding this specimen as the type of a new genus. The characters on which he founds the genus *Mochlorhinus*, are :—"1st, the usual angular ridge between the upper surface of the skull and face is wanting;" 2nd, the palate has the vomer elevated in front of the palato-nares, and the palatine bones at their sides, so as to form three prominent tubercles," and "upon the summits of these tubercles are minute teeth;" and 3rd, "the head appears to be much more compressed from side to side than is usual in *Ptychognathus*." With regard to these features it may be pointed out: 1st, that though owing to the skull being narrower and the supraorbital crests being much more prominent, the transverse angular ridge is less developed, it is still quite distinct though rounded, and the top of the snout makes with the plane of the preparietal a less obtuse angle than is met with in any of the other species; 2nd, the three tubercles found on the palate are formed not by the vomer and the palatines, but by the premaxillary and the palatines. They are exactly similar to those found in *Lystrosaurus McCaigi*, and differ very little from those in other species of *Lystrosaurus*, and I cannot find any indications of teeth on any of the tubercles; and 3rd, the

head is not nearly so much compressed as in *Lystrosaurus McCaigi*, and as a good deal of the flattening seen in the skull is due to pressure, it is quite possible when a perfect skull is obtained that it will be found to be as broad as *Lystrosaurus latirostris*. In all its osteological details, so far as can be made out, the skull agrees closely with the better known species. The large supra-orbital ridge is almost exactly similar to that in *Lystrosaurus McCaigi*. The figures of the skull in Seeley's paper are unsatisfactory. In figure 1 the jugal arch is shown as if running parallel to the postfrontal (postorbital)—in the specimen it is directed much more towards the posterior end of the postfrontal. The bone marked lachrymal is the nasal. In figure 3 the bone marked vomer is the premaxillary.

Bethulie, O.R.C.

*Lystrosaurus sp.?*

No. 13. This a badly weathered skull, with all the surface bones gone. Probably it belongs to *Lystrosaurus latirostris*. Posteriorly it is very broad.

Elandsberg, nr. Cradock. Pres. by Mr. R. ALLWRIGHT.

Fig 3, Plate 1:—Side view of skull of *Lystrosaurus McCaigi*, about ½ nat. size.— (partly restored) col., columella; fr., frontal ju., ; jugal; la., lachrymal; mx., maxilla; na., nasal; pal., palatine; par., parietal; p. fr., prefrontal; pmx., premaxilla; p.o. postorbital; po. fr., postfrontal; pt., pterygoid; qu., quadrate; sph., sphenoid; sq., squamosal; vo., vomer.

On the Remains of *Procolophon* in the Albany Museum.—By R. BROOM, M.D., B.Sc., C.M.Z.S.

The very large series of specimens of *Procolophon*-remains in the Albany Museum is probably the finest that has ever been brought together. The specimens are from two localities which, though 100 miles apart, are probably on the same geological horizon. The first series of specimens were collected by Mr. D.

White, at Donnybrook, in the Tarkastad district. The type specimens in the British Museum, described by Owen, were sent to London by Dr. Atherstone, and in the British Museum catalogue they are stated to have come from "Tafelberg," but there is no doubt the London specimens were also collected by Mr. White, at Donnybrook. These specimens are in a ferruginous fine-grained sandstone, and as the bones are usually softer than the matrix, the specimens are difficult to develop and the sutures and delicate details of the bones are usually but imperfectly shown. The second series of specimens were collected by Messrs. A. E. and H. Trollip at Fernrocks, near Tafelberg Station. They comprise a large series of weathered and broken nodules of indurated fine-grained sandstone, in which are impressions of skulls and other bones of *Procolophon*. In most cases all traces of the bones is completely weathered away, but as the matrix is almost as hard as flint most perfect impressions remain. In many specimens the impressions indicate that the bones have been imbedded in almost undisturbed positions. In others, the bones, when imbedded, have been considerably displaced. By taking casts of the various impressions it is possible to get the details of almost every bone of the skeleton. As I intend elsewhere to publish a full account of the osteology and affinities of *Procolophon*, I shall in the present paper merely briefly describe the various specimens in the Museum on which the detailed account will be based.

The specimens represent the remains of animals of various sizes, but as in the one locality large, small, and medium sized specimens occur, and the characters, other than size, which distinguish them, are unimportant, I think all the specimens may safely be referred to the one species, *Procolophon trigoniceps*. —OWEN.

*Procolophon trigoniceps*. - OWEN.

1. An almost perfect skull with the lower jaws in position. The bones are slightly crushed and the sutures not very distinctly seen. The right jugal arch and most of the right lower jaw are hidden by matrix. The specimen is valuable as showing the snout in almost perfect condition. The nasal bones are continued forwards in advance of the plane of the incisor teeth, and the anterior nares are directed outwards and downwards. The premaxillaries, which each bear 3 teeth, are anchylosed together, and send forwards and

upwards a well-developed median process which passes up between the two nasals and completely divides the two nostrils.

Donnybrook. Presented by Mr. D. WHITE.

2. A very good skull, wanting only the anterior end of the snout, but with the right suborbital region and the greater part of both jaws hidden by matrix. The cranial sutures are well seen. A few phalanges are also seen on the same specimen.

Donnybrook. Presented by MR. D. WHITE.

3. A right lower jaw displaying the inner surface of the bone. Also a few other very fragmentary remains.

Donnybrook. Presented by MR. D. WHITE.

4. A slab showing the greater part of the vertebral column, ribs, fragments of ilia, femora and a tibia of a medium sized animal. This is the specimen which was developed under Prof. Seeley's direction, and has been figured and described by him (Phil. Trans. 1892. B. Plate 23). Seeley's description is very accurate, but the figure is unsatisfactory. The small bones which Seeley regards as caudal ribs to the 13th and 14th caudal vertebræ are undoubtedly chevrons.

Donnybrook. Presented by Mr. D. White.

5. Large nodule, showing cast of a large skull with both jaws in position. The portion with the cast of the nasal bones has been broken off, but the fracture permits of the display of the cast of the inner processes of the prefrontal end of the vomers, transpalatines and palatines. The nodule also shows casts of the upper part of the vertebral column, with however the vertebræ much displaced and imperfectly displayed. The cervical and dorsal vertebræ have had well developed intercentra. There are also casts of a portion of right femur and tibia. The remains have been those of a very large animal with a broad head.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

6. Large nodule with cast of a large skull. The specimen is badly fractured, but the cast of the inner side of the left jaw

is well shown, and also the structure of the pterygoid, and its relations to the quadrate and squamosal.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

7. Imperfect cast of small skull and upper cervical vertebræ. The specimen also shows the cast of the interclavicle, left clavicle and left scapula and precoracoid.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

8. Broken nodule showing remains of skull and upper vertebræ of a medium-sized animal. Fairly good impressions are shown of the lower jaws and of the right quadrato-jugal horn. The central region of the skull has been broken across above the pterygoids, and shows the upper surface of these bones which have not been weathered out, and also the upper surface of the basisphenoids and basioccipital. Owing to incomplete weathering the upper cervical vertebræ cannot be very distinctly made out, but there appears to be a rib springing from the axis and from each of the succeeding vertebræ.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

9. Badly weathered nodule, showing cast of back of the head and of a number of cervical and dorsal vertebræ, and ribs of a moderate-sized animal. Though the parietals are large, the quadrato-jugal bones are smaller proportionally than in some other specimens. The connection of the quadrate and the pterygoids is very well shown.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

10. Fine cast of the bones of a small animal. The lower jaw has but 8 teeth. Casts of a portion of the interclavicle and of both clavicles are shown. There are also fairly good casts of the left precoracoid and coracoid, and of the right scapula and humerus.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

11. Badly weathered impression of bones of skull of a fairly large animal.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

12. Badly weathered impression of bones of skull. The bones have been much crushed, but the specimen shows very distinctly the cast of the articular end of the quadrate.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

13. Weathered cast of bones of skull of a small animal. Shows fairly well the relations of the quadrate to the squamosal. The lower jaw has 9 teeth, of which the 4th is very much smaller than the others.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

14. Weathered cast of bones of skull, with lower jaws and a few upper vertebrae. The cast has been broken across behind the orbits and displays beautifully two delicate columellæ cranii, very similar to those of lizards.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

15. Cast of a small skull—about the size of the type. Shows the impressions of both jaws well, and the pre-vomerine teeth. In the lower jaw there have been 9 teeth, of which the 4th was small.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

16. Large nodule showing cast of a moderately large skull—imperfect and badly displayed. There are also impressions of most of the cervical and dorsal vertebrae and ribs, and imperfect impressions of the right scapula and humerus. On the same nodule are also imperfect impressions of the skull of another individual. The casts of the centra of the vertebrae show that the notochord has been persistent.

Presented by Messrs. A. E & H. TROLLIP.

Fernrocks, Tafelberg.

17. Imperfect and weathered cast of the palatal surface of the skull, showing the pre-vomers, palatines, pterzgoids, transpalatines and basisphenoids. There are also imperfect impressions of a few upper cervical vertebrae.

Presented by Messrs. A. E. & H. TROLLIP.
Fernrocks, Tafelberg.

18. Nodule showing the impression of the maxillaries, and of the upper surface of the palatal bones. There are also shown the impressions of the upper 5 cervical vertebrae.

Presented by Messrs. A. E. & H. TROLLIP.
Fernrocks, Tafelberg.

19. Much weathered cast of the palate, showing very satisfactorily the palatine processes of the premaxillaries, the pre-vomerine and pterygoid teeth. The teeth of tbe maxillary bone are seen to be 7 in number, of which the 1st two are smaller than the others. The teeth, which may be regarded as molars, have broad flattened crowns.

Presented by Messrs. A. E. & H. TROLLIP.
Fernrocks, Tafelberg.

20. Broken nodule showing a very fine cast of the base of the skull. The specimen shows casts of the greater part of the pterygoids, the basisphenoids, basioccipital, and the prootic. Some of the connections between the quadrate, quadrato-jugal and pterygoid are also well shown. Casts are also seen of the cervical and of a number of the dorsal vertebrae and ribs.

Presented by Messrs. A. E. & H. TROLLIP.
Fernrocks, Tafelberg.

21. Broken nodule, showing impression of the bones of the middle region of the skull. The relations of the pterygoids to the palatines and transpalatines are well shown.

Presented by Messrs. A. E. & H. TROLLIP.
Fernrocks, Tafelberg.

22. Small broken nodule showing impressions of the jaws and of the bones of the back of the skull of a small animal. The specimen shows beautifully the relations of the quadrate,

pterygoid, and squamosal, and also the relations of the columellae to the pterygoids. There are seen to have been 10 teeth in the upper jaw and 9 in the lower.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

23. Fragment of a nodule showing casts of the bones of the prefrontal region, and casts of the upper side of the pterygoids, and of the quadrates. There is also seen what appears to be the cast of the anterior end of the prootic.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

24. Small nodule showing impression of the crushed remains of a small skull. The cast of the broad tops of the molar teeth is well shown.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

25. Cast of the left jugal arch and of the quadrato-jugal, and the quadrate of a large animal. The shape of the quadrate articular surface is well shown.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

26. Cast showing the impression of the upper surfaces of the right nasal, prefrontal and lachrymal, and of the right pterygoid, palatine and transpalatine.

Presented by Messrs. A. E. and H. TROLLIP.

Fernrocks, Tafelberg.

27. Cast of the bones of a small skull, imperfectly displayed. In the lower jaw there are seen to have been 9 teeth, the anterior ones pointed, the posterior with broad crowns.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

28. Split nodule showing impressions of the pterygoids, maxillary teeth and right mandible of a medium sized animal,

There appear to have been 9 teeth above and 9 below. The 9th above has been small and pointed. The teeth of the upper and lower jaws alternate but two mandibular teeth—the 3rd and 4th—fit in between the 3rd and 4th of the upper jaw. The 3rd lower tooth is much smaller than the others.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

29. Weathered nodule showing casts of some detached bones of a medium sized skull—especially the cast of the outer side of a left mandible and the cast of the base of the basioccipital and basisphenoids. On the same nodule there is the cast of a number of cervical and upper dorsal vertebrae and ribs which may belong to a different individual.

Presented by Messrs. A. & H. TROLLIP.

Fernrocks, Tafelberg.

30. Good cast of the premaxillary, maxillary, prevomerine and pterygoid teeth. There have been 3 premaxillary pointed teeth, and six maxillary teeth, of which the first only is somewhat pointed.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

31. Weathered cast of palate of a small animal. There have been 3 pointed premaxillary teeth, and 7 maxillary teeth. The casts of two displaced lower jaws are also shown, one of which has had 9 teeth, of which the 2nd and 3rd have been somewhat grooved.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

32. Nodule showing the weathered cast of right mandible, both pterygoids, and the quadrato-jugal and squamosal of the right side. There is also well shown a cast of the basioccipital region with the upper cervical vertebræ in position. The atlas is seen to be composed of an arch and an inferior element, while between the atlas and the axis there has been a pair of intercentra. The intercentrum between the 2nd and 3rd vertebræ has also been paired, but the succeeding intercentra, though very large, have

apparently been single. There is evidence of there having been a distinct and well developed proatlas.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

33. Split nodule showing cast of the upper border of the lower jaws of a medium sized animal, and also casts of a number of cervical vertebræ. There have only been eight teeth in each mandible, of which the first 3 are pointed.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

34. Portion of a nodule showing the impressions of the outer sides of the left mandible and jugal arch of a small animal. The specimen is in splendid preservation, and shows the sutures very distinctly.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

35. Split nodule showing a good cast of the outer side of the left mandible, cast of lower end of left femur, of many ribs, and of a series of abdominal ribs. These latter are seen to consist of an inner bifurcated series, with at least three additional splint bones passing outward from the presumed innermost element.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

36. Nodule showing very imperfect impression of left jaw and mandible. There have been 9 teeth in the mandible.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

37. Nodule showing cast of the nasal cavities of a medium sized animal; also casts of both mandibles, which are displaced. The cast of the inner side of the left mandible shows the structure of the symphysis very perfectly, and all the mandibular teeth. The first tooth is large and round, and has at least one well marked groove on its inner side. The second tooth is considerably smaller and is

very distinctly grooved. The third is small and is also grooved. The molars have all broad though fairly sharp crowns.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

38. Portion of a nodule showing imperfect cast of part of left maxilla and jugal end of the left mandible.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

39. Small nodule showing cast of part of palate and maxillary teeth of small animal. Very perfect cast of the upper molar crowns is shown.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

40. Very fine cast of pterygoids, basisphenoids and basioccipital of a medium-sized animal. Also cast of both mandibles, and of atlas and axis.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

41. Portion of the skull of a small animal. The parietals are fairly complete. The specimen also shows very distinctly the right squamosal, and its attachments to the quadrate, the parietal and the "epiotic."

Donnybrook. Presented by Mr D. WHITE.

42. A few fragments of the skeleton of a small animal. The only portion of any imp ortance is a part of the left mandible showing the thorough anchylosis of the teeth to the dentary.

Donnybrook. Presented by Mr. D. WHITE.

43. Large weathered nodule showing fairly good cast of a large animal. The nodule has been split, and shows very well the structure of the pterygoids.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

44. Very fine cast of the palate of a medium sized animal, and also fine cast of the interclavicle, of the right coracoid and of the right precoracoid and scapula. The specimen is the only one which shows that there has been present a distinct true vomer—the so-called parasphenoid of most authors. Its relations to the basisphenoids and to the pterygoids are very similar to those of the so-called "parasphenoid" in Palœohatteria and Sphenodon.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

45. Very fine cast of interclavicle of a large animal. Also on the same nodule imperfect cast of both coracoids and precoracoids. Also a fine cast of the upper end of the left humerus.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

46. Nodule showing imperfect casts of anterior end of interclavicles, both clavicles, both precoracoids, of portions of both scapulae and of both humeri. There are also seen impressions of the neural arches of a few dorsal vertebrae, and of a number of ribs.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

47. Specimen showing casts of posterior end of the interclavicle, of portions of both coracoids, and of a series of ribs. There are also seen impressions of a few abdominal ribs, and of a displaced clavicle.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

48. Nodule showing impressions of 19 vertebrae and many ribs of a small animal. There is also seen the impression of a portion of the right side of the skull, and of a considerable portion of the right arm. The impression of the ulna is perfect and there are fairly good impressions of the ulnare and pisiform.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

49. Very fine impression of the under surface of the left carpus of a large animal. The impression shows the lower ends of radius

and ulna, 9 carpal bones, the 5 metacarpals, and the phalanges of the 1st and 5th digits. The carpals are believed to be radiale, intermedium, ulnare, pisiform, centrale, 1st, 2nd, 3rd, and 4th carpalia. The first metacarpal is very broad and irregular. There are four phalanges in the 5th digit. (See Fig. 4, Pl. 1).

On the same slab is the weathered impression of a fibula.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

50. Imperfect impression of back of skull of a small animal, with impressions of a number of the upper vertebrae. There are also fairly good impressions of the precoracoids and imperfect casts of the coracoids, clavicles, interclavicle and upper end of the left humerus. On the right side, the lower end of the scapula is seen articulating with the precoracoid and coracoid, and it is seen that the precoracoid does not extend in advance of the scapula, as has been hitherto believed.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

51. Weathered nodule showing impressions of a fragment of the skull and of 23 vertebrae—all presacral, and of many ribs.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

52. Small nodule showing fairly good cast of the outer side of right shoulder girdle and of left coracoid. Also cast of the right humerus, showing that there has been a well-developed entepicondylar foramen or groove, but no ectepicondylar foramen. There are also impressions of the bodies of a series of dorsal vertebrae. Two small intercentra are shown. The front of the scapula is in a line with the front of the precoracoid, the large clavicle lying along the anterior borders of each.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

53 and 53A. Split nodule showing casts of lower end of left humerus, ulna and radius, and of a number of displaced carpals and metacarpals.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

54. Badly weathered nodule showing cast of fragment of mandible and of the two clavicles.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

55. Nodule showing casts of portion of the back of the skull of a small animal, and impressions of the first twelve vertebræ and ribs. The structure of the axis and atlas is not very well shown.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

56. Small nodule showing impression of part of left preocular portion of small skull.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

57. Impressions of ten dorsal vertebræ and ribs.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

58. Impressions of the neural arches of five dorsal vetebrae.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

59. Impressions of eight dorsal vertebrae and ribs.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

60. Nodule showing impressions of lower jaws of a small animal. There are also seen impressions of part of interclavicle and of right clavicle, and of the 1st, 2nd, 3rd, and 4th digits of the left manus. There have been 5 phalanges in the 4th digit—the first four being well shown in the specimen. The 3rd digit has had 4 phalanges, of which 3 are shown. The second digit has had 3 phalanges, impression of all of which are shown.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

61. Cast of seven dorsal vertebrae with ribs, and impressions of a series of abdominal ribs.

Presented by Messrs. A. E. and H. TROLLIP.

Fernrocks, Tafelberg.

62. Impressions of the bodies of three dorsal vertebrae, showing no indications of intercentra.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

63. Weathered nodule showing impressions of a large number of bones disconnected and probably belonging to two individuals. Among these are the impressions of the posterior dorsal vertebrae and the first three sacral vertebrae of a large animal; impressions of a number of other large dorsal vertebrae; impressions of eight caudal vertebrae from a part of the tail much behind the sacrum; and also the impression of a small manus. This manus, which is the left, shows the claw-phalanx of both the first and the second digits, and all five metacarpals. The carpal elements are a little displaced, but they seem to be 1st, 2nd, 3rd and 4th carpalia, the radiale, ulnare, and centrale.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

64. Broken nodule showing imperfect impressions of almost the whole series of presacral vertebræ and many ribs. There are also impressions of the inner side of the left scapula and left clavicle, and of left coracoid and precoracoid; an imperfect impression of a part of the back of the skull, and of the right humerus. There are good impressions of a series of abdominal ribs. Though the remains are much distorted, the abdominal ribs from their position in the specimen seem to have been mostly in the posterior abdominal region. The very long interclavicle, no doubt, served as a support for the more anterior region.

Presented by Messrs. A. & H. TROLLIP.

Fernrocks, Tafelberg.

65 Nodule showing impressions of a number of dorsal vertebræ. Between one pair a large intercentrum is seen.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

66. Nodule showing impressions of both ischia, part of left pubis, part of left femur, and of the almost perfect left foot. The ischia are large flat bones which articulate with each other in the middle line. In the foot the 1st and 2nd digits are complete—the 1st with 2 and the 2nd with 3 phalanges. Of the 3rd digit casts of the metatarsal and 2 phalanges are shown ; of the 4th only of the metatarsal. Casts are seen of the 1st, 2nd, and 3rd tarsalia, and of a portion of the tibiale. On the same nodule is seen a cast of the first 9 caudal vertebræ. Though the impressions are somewhat weathered, one or two intercentra can be seen.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

67. A beautifully preserved impression of the ventral surface of the ischia and pubes. There are also shown impressions of the centra of a series of presacral and postsacral vertebræ. and of portions of the ilia, and of the right femur. Connected with the four presacral vertebræ shown, there are well-developed intercentra, and an intercentrum has been developed in front of what appeared to be the 2nd and 3rd caudal vertebræ, but there is no indication of an intercentrum in front of the 4th and 5th vertebræ. Probably chevrons begin at the 4th vertebra. There has been no obturator foramen between the pubis and ischium, but the pubis is pierced by a small round foramen near its articular border. (fig. 5, pl 1).

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

68. An almost perfect impression of the whole of the left leg of a small animal. Tibia and Fibula are both well developed, the fibula being only a little more slender. The tarsus consists of a fairly large tibiale united to a small intermedium, a fairly large fibulare and four tarsalia, of which the 4th is the largest. Impressions of all five metatarsals are well seen, and of the phalanges of the first four digits There are respectively

2, 3, 4, and 5 phalanges in the first four digits. Most probably in the 5th there were 4. (See fig. 6, pl. 1.)

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

69 & 69A. A split nodule, showing beautiful casts of the bones of the left leg of a moderately large animal. There are indications of all the tarsals, which are very similar to those of the previous specimen. There are also seen impressions of a few ribs and vertebræ.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

70. Badly weathered nodule, showing impressions of a number of isolated vertebræ, of portion of mandible, and of a femur.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

71. A fairly-well preserved left ilium, displaying the inner side.

Donnybrook Presented by MR. D. WHITE.

72. A moderately well preserved right humerus, and a few other very fragmentary remains.

Donnybrook. Presented by MR. D. WHITE.

73. A few fragmentary dorsal vertebrae and ribs.

Donnybrook. Presented by MR. D. WHITE.

74. Weathered nodule showing impressions of the sides of 4 dorsal vertebræ. Between each there is seen the impression of a well-developed intercentrum.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

75. Nodule showing impressions of some tarsal and metatarsal bones of a large animal. The impressions are imperfect, but

appear to be lower end of tibia, tibiale, portion of fibulare, 2nd, 3rd, and 4th tarsalia and 2nd, 3rd, and 4th metatarsals.

Presented by Messrs. A. E. & H. TROLLIP.

Fernrocks, Tafelberg.

76. Portion of a nodule showing impressions of a few dorsal vertebrae and 7 imperfectly weathered ribs.

Presented by Messrs. A. E, & H. TROLLIP.

Fernrocks, Tafelberg.

The examination of the above specimens shows that *Procolophon* has its affinities with *Palæohatteria*, and that it is not a near ally of the Theriodonts. In only one important character does it resemble the Theriodonts viz. the possession of an ossified precoracoid; while the possession of abdominal ribs, a persistent notochord, and the presence of 3, 4, 5, and 4 phalanges in the 4 outer digits, remove it far from the Dicynodonts, the Theriodonts, and the Monotremes and place it somewhere among the primitive Rhynchocephalians,—possibly not far from *Palæohatteria*.

**Fig. 4, Plate 1** :—Casts of the impression of the carpal and other bones of the left manus of a large *Procolophon* (Spec. 49). Nat. size. U, ulna; R, radius; p, pisiform; u, ulnare; i, intermedium; r, radiale; c, centrale; 1, 2, 3, 4, the four carpalia.

**Fig. 5, Plate 1** :—Cast of the impression of the front of the ischia and pubes of *Procolophon* (Spec. 67). Nat. size.

**Fig. 6, Plate 1** :—Cast of the impression of the bones of the left foot of a small *Procolophon* (Spec. 68). Nat. size. F, fibula; T, Tibia; f, fibulare; i and t, intermedium and tibiale united; 1, 2, 3, 4, the four tarsalia.

On some Hottentot and Bushman Pottery in the collection of the Albany Museum.—By Dr. S. SCHÖNLAND, Hon. M.A. Oxon.

All along the coast of Cape Colony from Namaqualand to the Bashee (and probably also further north) one finds a large number of kitchenmiddens. They are chiefly composed of large shells, and this fact alone points to their having been accumulated by human agency; but with them one finds bones of animals, the marrow bones being split open for obvious purposes. With them and near them one finds ashes and coals, stone-implements, fragments of pottery, bone awls, &c. Though of immense extent, our knowlege of them is comparatively recent, and a systematic exploration will no doubt yield very interesting results as to the knowledge of the races of man which inhabited the southern extremity of Africa during prehistoric times. Some of these middens are comparatively recent, while others most likely go back to very remote times.[1] The question naturally presents itself: Who left these remnants of the past? They were certainly not left by any Bantu tribe, and there remain only the Bushmen and the Hottentots to consider. As a rule they are ascribed to impoverished Hottentots, but Theal maintains[2] (and, I think, rightly so) that all the shell-heaps on the S. A. coast were not made by impoverished Hottentots. A few—possibly a good many—were made by Bushmen, as is proved by the paintings overhanging the deposits. There must also have been mixed breeds along the coast in olden times, as there are to-day in the territory about the Lower Vaal River, and some of the remains may be due to them. These mixed breeds arose from the union of Hottentot men with captured Bushwomen, for though the races were constantly at war, young

[1] See George R. McKay, "Evidence of the Antiquity of Man in East London, Cape Colony." Natural Science, Vol. XI, November, 1897. The complete paper of which this is only an abstract, together with a number of illustrative diagrams, is preserved in MS. in the library of the Albany Museum.

[2] G. M'Call Theal, "The Portuguese in South Africa," London, 1896, p. 1.

females were generally spared by the less savage of the two. It is usual to call the Midden-people by the name of "Strandloopers." This term seems to have been originally restricted to a small Hottentot tribe found in Van Riebeck's time,[1] and though it is convenient to give it now the current extended meaning, it must always be remembered that from an ethnographical point of view it cannot be clearly defined, while as a rule it signifies Primitive Hottentots. Before further discussing the question whether it is possible to distinguish between Hottentot and Bushman pottery generally, I will describe a few of the pottery relics in the Albany Museum which must be ascribed to either of these two races. The finest of these is obviously the one reproduced on Plate II, fig. 1 (C 276 of the Museum Register). It is 5½ in. wide at the mouth, 14½ in. high, and its greatest breadth is 8¾ in. Though of very elegant shape, it will be noticed that it is not quite symmetrical. It is reddish in appearance, both inside and outside, but black on the fractures, thus indicating that it is very well burned of clay taking from termiteheaps with which the pupæ of termites had been mixed. As ornamentation it only shows a number of nearly parallel lines round the neck. It is evidently hand-made without the aid of a potter's wheel. It is rather thin and evenly built throughout, only the bottom perhaps being somewhat thick. In contemplating and handling it one cannot help sharing Kolbe's[2] enthusiasm for the Hottentot's art of making pots. He mentions several times that an European potter could, without tools, not produce such excellent pots as these savages built up with their bare hands. It was found upside down in a hole, evidently specially prepared for it, by Mr. R. L. Walker on his farm near Port Alfred, and presented to the Museum eventually by Mr. Mitford Bowker. In this hole the pot had probably been burned as described by Kolbe, though no remnant of fires could be seen when I examined the hole with Mr. Bowker. I must add, however, that at the time it did not strike me to look for them, and besides in the shifting sand its traces may have been removed. The hole was situated towards the edge of a flat piece of ground, several acres in extent, just behind Mr. Walker's house, and about 4 miles east of Port Alfred, and only separated from the sea by a range of sandhills. This piece of

[1] See Gustav Fritsch, "Die Eingeborenen Sued Afrikas," Breslau, 1872, p. 265.

[2] Peter Kolbe, "Beschryving van de Kaap de Goed Hoop," Amsterdam, 1727, II, p. 62, 90.

ground has been used as a ploughed field until the wind recently removed the surface soil and exposed what must have been the camping place of a Hottentot horde.

There are still some heaps of stones on this ground which show plain signs that they were used as fire-places and there are a few mounds of shell which prove that these people lived to a certain extent on shells.[1] A few broken marrow bones of a large animal (Buffalo ?) were also found. Bits of pottery were strewn all over. There were also numerous pieces of ochre in various colours. Of stone-implements, rubbers (or "mullers") were very numerous. A few of these were collected by Mr. Bowker and myself, and we also brought away the following, most of which were found by Mr. Bowker: 1 grooved stone (usually considered to be an arrow-sharpener); 1 complete shallow biconcave stone-dish; halves of 2 other shallow dishes; flat digging-stones (2 complete, 1 with excentric hole, 1 in which the perforation is not complete, and one half of another); 3 stone knives and a scraper. As cutting stone-implements were very scarce, and as there was almost an entire absence of stone implements that could be used as spear-heads or arrow-heads, though they are frequent in kitchen-middens only a few hundred yards distant (at the mouth of the Rufanes river), it is possible that this encampment was used at a comparatively recent date. This view is strengthened by the finding of a bit of coarse native pottery (made like some European prehistoric pottery of clay mixed with coarse quartz sand), which can only have been the neck of a bottle copied from a European model. Mr. Bowker told me that when his father came to the adjoining farm Tharfield in 1820 with the British Settlers, some of the strandloopers of the neighbourhood were employed by them in burning lime, and it is quite possible that the encampment does not date further back than the time of the British settlement of Lower Albany.

Five pots similar to the one described above (though not of such an elegant form) and also ascribed to Hottentots are in the collections of the S. A. Museum, Capetown. Mr. L. Peringney, F.E.S., was good enough to have them photographed for me. Four of them

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[1] The following shells were represented on the mounds: *Cominella porcata*, *Haliotis midæ*, *Oxystele merula*, *Patella rustica*, *P. tabularis*, *P. sp.*, *Purpura capensis*, *Turbo cidaris*.

I am indebted to Col. Grant, of Port Alfred, for calling my attention to this "kitchen-midden."

show the "ears" which are said to be characteristic of Hottentot pottery. They consisted of thickened portions below the neck through which a hole was made which allowed a sinew or thong of hide to be passed in order to suspend the pot. They were either slightly raised or flush with the surface of the pot. It is interesting to note that in the 5th pot these ears are only indicated by 2 round projections which evidently serve only to ornament the pot and are of no practical use. It need not, therefore, surprise us when we find that they are absent in our pot. But that "eared" pottery was used by the people by whom it was left behind, was proved by the fact that a number of "ears" were found on their encampment some of which are represented on plate II, fig. a–f.[1] Pots similar to ours, were made by the Ancient Egyptians, Assyrians, Greeks, Romans, etc. The Ancient Egyptians even made "eared" pottery which were slung on a small cord of bast-fibres. All these nations, however, used the potter's wheel which was unknown to South African natives before the advent of Europeans and is even now scorned (with the exception of some Basutos ?) by those who still make their own pottery. Besides S. A. tribes turned their knowledge of the art of pottery to no other account but for making pots (and comparatively recently bottles), and though the beautiful and artistic terra-cotta figures of Greece were quite unknown to the more Ancient Egyptians they made dolls and other rude figures of pottery.[2] A direct connection between the Ancient Egyptians and the Hottentots (which was deduced by Bleek and others on linguistic grounds, though repudiated by other authorities) can, therefore, scarcely be traced in their pottery. We must pre-suppose a missing link which has to be looked for in pre-historic times. It may here also be stated that all Hottentot and Bushman pottery is unglazed, though as a rule quite watertight (owing perhaps, as Kolbe already pointed out, to a mixture of white-ant "eggs" with the clay used).

Plate II, fig. 2, represents a pot (C. 14 of the Museum register) found by Mr. F. Cock in the sandhills not far removed from a kitchenmidden at the mouth of the Rufanesriver. It is of much

[1] Eared wooden vessels were also made by Hottentots. See illustration in William Burchell, "Travels in the Interior of South Africa," London, 1822, Vol. I, p 406.

[2] Adolph Erman, "Life in Ancient Egypt," transl. by H. M. Tirard, London, 1894, p 457.

coarser make and not so well burned as the first. In shape it resembles an Egyptian bowl of red polished ware figured by Samuel Birch.[1]

It is about 9½in. wide at the mouth.

The kitchenmiddens at the mouth of the Rufanes River have yielded a number of other specimens of pottery to the Museum collection. These include a nearly complete cup[2] (C 107 of the Museum register) found by Mr. F. Pym. It is nearly hemispherical and only 3¼in. wide, and 1¾in. deep. It is without ornamentation and quite black. Another (C 110), also found by Mr. Pym, indicates a large pot of somewhat conical shape, with wide mouth and flattened bottom It is without ornamentation, but bits showing the parallel lines on the neck as in fig. 1, 5a, and 6a, are also frequent, and lastly we find occasionally bits. which are ornamented by impressions of lines of dots or broad short lines (fig. 5, d-g). Some are burned quite red, and therefore evidently made of pure clay. Numerous other fragments from kitchenmiddens situated on the coast from the Peddie district to Port Elizabeth are in the Museum collections, but none of them show any interesting features beyond those to which reference has already been made, except that some have neat holes bored through them which were for a long time a great puzzle until the portion of the pot represented on fig. 3 gave a clue to them.

This fragment (C 192 of the Museum register) which gives a fair idea of the form which the pot had when complete, was found, broken into small pieces, in a cave at King's Quarry, close to Grahamstown. That this cave was occupied by Bushmen is shown by the fact that on the walls there were, until recently, a number of characteristic Bushman paintings. Whether the pot was made by the Bushmen themselves, or obtained from neighbouring Hottentot tribes is impossible to say. I have, however, not been able to find any traces of pottery in or about some undoubted Bushman caves along the Botha's river, about 5 miles north-east of Grahamstown, nor were there any stone implements, which were numerous in the King's Quarry cave. A large fragment of a very wide-mouthed pot with one "ear," but without ornamentation, was found by Mr. C. Butt in a cave near the Bushman's River-mouth (C 222 of the

[1] Samuel Birch, "History of Ancient Pottery," New and revised edition, London 1873 (No. 21.)

[2] This, like the first and others, was received in fragments and successfully joined together.

Museum register) which had also, most likely, been inhabited by Bushmen. The pot to which the portion represented on fig. 3 belonged, was rather coarsely made, and not particularly well burned. It is about 11½in. wide at the mouth. In addition to the holes through the "ears," it exhibits 5 neatly bored holes, 4 of which are clearly shown in the figure. These are in pairs and their position indicates that they were used to bind together the pot when it was threatening to fall to pieces by showing cracks. Anybody who has seen what pains our natives even now sometimes take to bind together cracked calabashes, and how cleverly they do it, will admit that this simple explanation of the occurrence of these holes in bits of native pottery is not far-fetched.

We now come to the small pot represented on fig. 4 (C 228 of the Museum register). It is 3½in. wide at the mouth, and of about the same height. It is made of very inferior material and very badly burned. The walls are rather thick and very unevenly finished. It shows sigés of having been used over a fire. It has three knobs (there are none on the side not shown on the figure) which represent a reminiscence of "ears." It was found by Mr. T. Cronwright about 300 or 400 yards from the Kleinemonde river (which is east of Port Alfred) and about a mile and a half from the sea in a very dense thicket. It was more than half buried in the ground. As in material and finish it is much inferior to the pottery hitherto considered, I am inclined to look upon it as made by Bushmen, though this view is incapable of proof. I find, to a certain extent, confirmation of this view in the samples of Bushmen pottery from the Stormberg, presented by Dr. R. Kannemeyer, F.L.S. (C 50-87 of the Museum register). In all these pieces the selection of material has not been so carefully made as in the pottery ascribed to Hottentots. They are also thicker and more clumsy than the latter, and throughout they are not particularly well burned. Some are plain like the pot represented by figure 4; others are, however, much more carefully and artistically ornamented than the pottery from the coast, as we might expect from a race so much more artistically inclined than the Hottentots. On figures 8 and 9 a number of these ornamented bits are reproduced. All the dots and lines on them are evidently separately made by hand. There are, however, two larger pieces in the collection (C 48 and 49 of the Museum register) which suggest a different method in the production of the ornamentation. It seems that at all events sometimes (as pointed out by Dr. Kannemeyer in a M.S. note attached to the specimens)

the Bushmen did not build up their pots in the same manner as the Hottentots, but first made rush-baskets which they smeared with clay on the inside. The whole was then burned, which caused the rushes to perish and the clay-pot, showing the impressions of the rushes, remained behind.

I have not seen any pottery made by Kalahari-Bushmen, and I am not sure whether they ever made any. Fritsch,[1] in speaking of the Bushmen generally. simply says, after describing their food : " For the preparation of such primitive food there is no long series of utensils required, but they have rough earthenware pots, which more frequently serve to preserve things in, than for cooking purposes." Burchell, though going everywhere minutely into details, never mentions Bushman pottery. But we must not forget that ever since Europeans colonised South Africa, the Bushmen led the lives of hunted animals, and it is possible, that previously, when they were able to lead a comparatively more settled life, they utilised earthenware pots to a larger extent. On the other hand it is possible that they only learned the potter's art from Hottentots. The Hottentots, wherever they came into contact with Europeans, soon lost the art of making pots of their own. Their philosophy of life was akin to that of the Indian chief who is reported to have said to a European[2] : " Oh, brother, you will never know the blessings of doing nothing and thinking nothing ; and yet, next to sleep, that is the most delicious. Thus we were before birth, thus we shall be after death." Such a race was bound to be absorbed by a stronger conquering race, and lose the few arts that, in their state of nature, were almost a necessity to to them. Again Burchell makes no mention of Hottentot pottery, and other writers on S. African natives only occasionally make a casual inference to it, while it seems to me that the praise bestowed on it by Kolbe, who knew the Hottentots at the beginning of the 18th century, is perfectly justified.

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[1] h. c., p. 317.

[2] F. Max Müller, " Lectures on the origin and growth of religion." New impression. London, 1898, p. 79.

**Explanation of Plate II.**

Illustrating Dr. S. Schönland's paper on Hottentot and Bushman pottery. (All figures are from photographs by the author).

Fig. 1.—Hottentot pot found about 5 miles east of Port Alfred. About $\frac{1}{6}$ natural size.

Fig. 2.—Pot found close to kitchen-middens in the sandhills near the mouth of the Rufanes River by Mr. J. N. Cock. About $\frac{1}{6}$ natural size.

Fig. 3.—Portion of a pot found in a Bushman cave close to Grahamstown. About $\frac{1}{6}$ natural size.

Fig. 4.—Bushman (?) pot found near the mouth of the Kleinemonde River by Mr. T. Cronwright. About $\frac{1}{5}$ natural size.

Fig. 5.—Fragments of pottery found in kitchen-middens near Port Alfred, showing various styles of ornamentation. Nearly $\frac{1}{2}$ natural size.

Fig. 6.—Fragments of pottery found in kitchenmiddens near Port Alfred, showing the "ears" through which sinews or thongs of hide were passed by means of which many pots were suspended. Nearly $\frac{1}{2}$ natural size.

Fig. 7 and 8.—Fragments of Bushman pottery found by Dr R. Kannemeyer, F.L.S., on the Stormberg, illustrating various styles of ornamentation. Nearly $\frac{1}{2}$ natural size.

On some South African species of *Aloe*, with special reference to those represented in the Herbarium of the Albany Museum (with descriptions of two new species).--By Dr. S. SCHÖNLAND, Hon. M.A. Oxon.

Our knowledge of the South African species of *Aloe* is to a large extent based on the plants cultivated in European gardens. In looking over Mr. J. G. Baker's monograph of them in the Flora Capensis (Vol. VI, p. 302), which was only published a few years ago, we find that of almost exactly half the number of species no single locality is mentioned, and that as regards these no reference is made to material grown in South Africa. This state of affairs is largely due to the fact that, to travelling collectors especially, they are rather troublesome to preserve. I may, however, mention that they can be very well preserved for the Herbarium if they are soaked for a few days in a strong solution of Cooper's sheep-dip and pressed in the ordinary fashion with frequent changes of paper. As is the case with other succulents, they naturally lose many of their characteristic features in drying, and to study them thoroughly one must have recourse to growing specimens and observe them for years. This I have been able to do with a number of species in my private collection, which has now been transferred to the Museum grounds, where they are all thriving in the open to the number of nearly 40 species, and I trust that one of the results of this paper will be, that all those interested in Botany in South Africa will assist me in making this collection as complete as possible. In this way I hope to greatly enlarge our at present lamentably deficient knowledge of the geographical distribution of these plants which form such an important feature of the Flora of South Africa, but I hope also to define the limits of the species better than it was hitherto possible, and lastly there is no doubt that we shall find that a large number of species are hitherto undescribed.

The Aloes cultivated in European gardens are grown under such unnatural conditions that many of them present features which

are not found under natural conditions, some of which will be referred to later on. Some species *may* have even changed to such an extent that they can scarcely be recognised in the wild state.

On the other hand a large number of species have retained their most important characters remarkably well (a fact which is worthy of attention), and when one makes a little allowance for results which cultivation in pots usually produces, there is frequently no difficulty in identifying wild specimens from published descriptions and figures.[1]

3 (305).[2]—*Aloe Cooperi*, Bak. This species is known from the Coast Region and Eastern Region of South Africa, but also occurs in the Transvaal near Johannesburg (Mrs. C. Hutton, no. 304, Ap. 96, in Herb. Albany Museum).

4 (306).—*A. micracantha*, Haw. var. Flowered in Botanical Gardens, Grahamstown, in Nov., 1901. The origin of the plants in the Botanical Gardens is unknown, but the late Mr. Russell Hallack told Mr. E. Tidmarsh that it grows on Botha's Hill, near Port Elizabeth, and Mr. Tidmarsh is under the impression that it grows south of Grahamstown. Its stem is about 1 foot high. Its leaves are slightly broader and the marginal teeth somewhat larger and more numerous than in the type. The white spots on the leaves are raised as correctly stated by Salm-Dyck.

5 (306).—*A. Kraussii, Bak.* Apart from Wood's figure ("Natal plants," III, plate 292) the type of this species is not known to me, but we have E. E. Galpin, no. 873, which is placed with it in the Flora Capensis. In the flowers of Galpin's plant in Herb. Alb. Mus., represented by two specimens, the perianth is decidedly curved, and altogether it seems to me to be referrable to *A. myriacantha*, Roem. et Schult., from which it only differs by its smaller size. The perianth is white, striped with green (Galpin in litt.), whereas Wood describes it in his plant as pale yellow with brownish tips. Mr. Galpin also thinks that his no. 973 is quite distinct from *A. Kraussii*.

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[1] This applies especially to the figures in Salm-Dyck, "Monographia generum *Aloes* et *Mesembrianthemi*," Bonnae 1836-1863.
The figures in earlier volumes of the "Botanical Magazine," and in De Candolle's "Plantes Grasses," must, however, as a rule be used with great caution.

[2] The numbers before each species refer to the Flora Capensis. Thus 3 (305) means the 3rd species on p. 305 of Vol. VI.

6 (306).—*A. myriacantha*, Roem. et Schult. This species is found from near sea-level (Kleinemonde, Mrs. G. White, no. 951, in flower Ap. 95) to an altitude of about 3,000′ (Highlands, B. South, no. 206, in flower March 92), but is also found near Grahamstown at an altitude of about 2000′ (Miss M. Daly and Miss M. Sole, no. 132). The following notes are from live specimens recently collected:

Perianth slightly curved below, but strongly curved in the upper third, decidedly two-lipped, upper lip narrow, composed of the upper parts of the median inner and of the lateral outer petals, lower composed of the spreading upper parts of the two inner lateral and of the horizontal upper part of the median outer petal; petals only united at the base, concave below, sub-plicate in the upper third; outer pale pink with three longitudinal darker greenish-red stripes which unite above; inner very pale yellow with a dark greenish-red longitudinal stripe in the centre, minutely cucullate at the apex; filaments flattened, very pale greenish-yellow; anthers pale red; pollen pale reddish-yellow; ovary green, six-furrowed, style pale green. The flowers are decidedly proterandrous, the anthers ripen gradually, starting with the median inner, the median outer one being the last.

7 (306). *A. aristata*, Haw.—Steynsburg, in flower in Port Elizabeth (Mr. W. Armstrong's garden), Oct., 1900, in Grahamstown, Dec., 1902. I have also had it from Dordrecht. The rosette of leaves is sometimes as much as 8″ in diameter, the peduncle is frequently branched, about 1 foot long, the perianth very slightly constricted above the base and slightly curved.

8 (307). *A. Boylei*, Bak.—E. E. Galpin, no. 1207, Barberton. Only the inflorescence is represented in Herb. Albany Museum.

9 (307). *A. humilis*, Mill.—This species flowers in August. The form figured by Salm-Dyck (l. c. sect. 15, fig. 1) is common near Port Elizabeth, while the larger forms are found further inland. Thus the one figured as *A. echinata* (sect. 15, fig. 2) is found in subcarroid places N.W. of Grahamstown, also near Sheldon and Somerset East, where the form described by him as *A. incurva*, Haw. (sect. 15, fig. 3) has also been found. A dried cultivated specimen from Cathcart (Flanagan no. 1324) which was lent to me by Mr. H. G. Flanagan, F.L.S., has been provisionally placed by me under this species. It has, however, deltoid-cuspidate bracts which I have not seen approached by any other form of *A. humilis* and it may be a distinct species.

10 (308). *A. pratensis*, Bak., is common in some places near Grahamstown amongst rocks on the edges of grass veldt. It flowers in September. Dr. P. MacOwan, in confirming my determination, told me that it is the same plant which he collected on the Boschberg. The colour of the perianth is yellowish-red, with some green in the centre of the tips. The perianth-leaves are quite free. Sim no. 4104 (Indwe, Dec. '99), collected in fruit only, is probably the same species.

13 (309). *A. longistyla*, Bak.—This plant is represented in our Herbarium from Brak Kloof near Grahamstown (collected by Mrs. G. White), Sheldon (collected by Mrs. C. Hutton), Somerset East and Laingsburg (collected by Dr. R. Marloth). I have no doubt of the correctness of the identification, but I find that the length of the perianth-tube varies. It is sometimes ¾ of the length of the perianth. Again the stamens are not "slightly" exserted as stated by Baker (Flora Cap. VI, p. 309), but the longest of them protrude sometimes nearly ½ inch while the style may protrude as much as 1 inch. The flowers are very decidedly protercgynous The perianth is coloured salmon-pink with a tinge of green in centre of tips. It has often been confused with some forms of *A. humilis*, with which, however, it can scarcely be said to be allied. It flowers in July.

14 (310). *A. Ecklonis*, Salm-Dyck.—A specimen collected by Glass (no. 563) in Howison's Poort, close to Grahamstown, is in the Cape Government Herbarium, and Mr. H. G. Flanagan has found it near Komgha (no. 1713, Feb. '93, alt. 2000′).

17 (310). *A. lineata*, Haw.—This species is very common near Grahamstown at an altitude of about 2000′. In its native state it is is frequently 4-5′ high, the trunk is covered with the old leaves, and is frequently branched from the base. It flowers from January to March. The following notes are from wild specimens:

Bracts at first closely imbricated, boat-shaped, green with reddish tips aud darker longitudinal lines, margin hyaline, white.

Perianth 1¼″ long, almost straight, slightly constricted above the base; outer petals of a pale brick-colour (testaceus), petals almost free, only slightly cohering at the base; but with lighter margin and green centre at the tips, inner petals with pale brick-coloured keeled centre which becomes green near the tip and with broad almost white margin.

19 (311). *A. striata*, Haw.—This species is also fairly common near Grahamstown where it flowers in midwinter, and where it is

known as the "Coral Aloe." A specimen with pure yellow flowers is cultivated by Mr. W. Armstrong at Port Elizabeth, a yellowish tint in the usually red flowers is, however, frequently observed in wild plants. Mr. E. E. Galpin, F.L.S., informs me that seedlings with prickly margins were raised in Queenstown Public Gardens. Perhaps this may be due to hybridisation.

19A. *A. Schönlandi*, Bak. (Plate 11I, fig. 2.)—("Gard. Chronicle," p. 430, Dec., 1902). Mr. Baker places this new species, (which, as I have now ascertained, certainly comes from the Somerset East district, whence Dr. Becker received a specimen some years ago) near *A. latifolia*, Haw. 1 am, however, inclined to place it close to *A. striata*, Haw. As Mr. Baker only had a leaf, a portion of an inflorescence and a photograph at his disposal, I will supplement his description by a few notes taken from a specimen growing in the Museum grounds:

Acaulescent. Leaves about 18, densely rosulate; the younger ovato-lanceolate, somewhat glaucous; the older ovate with a reddish tinge, largest leaves about 12″ long, 5–6″ wide in the widest part and about ½″ thick, above almost flat, below convex; all leaves indistinctly striate and with longitudinal, interrupted lines of very faint white spots which are more numerous on the lower surface than on the upper. Tips of the younger leaves subcarinate, of the older dried up and recurved or twisted; margin cartilaginous, reddish with yellowish border, marginal teeth small, reddish brown with yellowish border, in the young leaves deltoid, sometimes 2 or 3 lobed, separated later into irregular groups through the splitting of the cartilaginous border of the older leaves (Plate III, fig. 2c). Inflorescence 3–4′ high, main branches with numerous empty bracts below the racemes, racemes about 10, at first short, dense, later rather lax, 2–8″ long; lower pedicels ½–¾″ long, upper gradually smaller; bracts lanceolate, about equalling the pedicels in length, pale with 3 or more distinct brown longitudinal lines. Perainth red with whitish margins around the lobes, 1–1¼″ long, subcylindrical, slightly constricted above the base, slightly curved; tube about ⅓ the length of the perianth, tips of lobes slightly bent outwards; stamens and style slightly protruding. Flowered in Grahamstown in June and October.

21 (312). *A saponaria Haw.*—I strongly suspect that under this name several distinct species are cultivated in European gardens. Unfortunately, the illustrations of De Candolle ("Plantes

Grasses," t 98, under *A. umbellata*, var. minor) and of Sims (Bot. Mag. t 1460, under *A. saponaria*, var. minor) are almost valueless and cannot help us in elucidating the matter, while Salm-Dyck's plate (l.c. sect. XXIII, fig. 1, under *A. umbellata*) differs in one tangible character from Baker's description (Flora Cap. VII, p 312). The latter describes the bracts as deltoid-cuspidate, whereas in Salm-Dyck's figure they are lanceolate-acuminate.

A specimen in Herb. Alb. Mus., collected by R. Schlechter (no. 9775), unfortunately without leaves, amongst rocks on the Zwartberg (XII. 96) has these deltoidcuspidate bracts, and was named by the collector *A. saponaria*, *Haw.* On the other hand, specimens from various parts of the Eastern Province of Cape Colony and from Natal (See "Natal Plants," by J. M. Wood, A.L.S., and Maurice S. Evans, M.L.A., Vol.1., plate 100) have lanceolate acuminate bracts. The plants which I have under cultivation vary, however, so much in size and shape of leaves, colour and markings of leaves, direction, number and size of prickles, that I cannot venture to separate them yet, especially as similar variations can be observed in an individual in which the conditions under which it is grown are altered from time to time. The forms from the Eastern Province, above referred to, flower chiefly in October.

22 (313). *A latifolia*, *Haw.*—A plant which is frequently grown in Grahamstown gardens under the name of "Soap-Aloe," and which is found wild in the neighbourhood, must undoubtedly be referred to this species. It flowers chiefly in January and February. All the specimens, however, I have seen, were acaulescent, and the plant forms numerous suckers by means of which it spreads quickly. European authors (including Baker) state that the stem reaches 1—2 feet in height, but this may be due to the effects of cultivation, as may be seen also in *A. striata* and *A. microstigma*, which, when grown under natural conditions, seldom develop a stem more than a few inches in height. The proportions of our plant, as grown in the Museum grounds. are somewhat larger than those given by Baker, the leaves reaching 16in. in length, and 4½in. in width, and all other parts are also larger; but I have seen numerous specimens which agree well with the measurements in the Flora Capensis. I must also mention that in our plants between the larger prickles on the margins of the leaves there are also smaller ones here and there, which sometimes are only just perceptable, and sometimes reach a length of nearly an eighth of an inch.

25 (314). ***A. obscura***, Mill.—There is a specimen of this plant, probably derived from our neighbourhood, grown in the Grahamstown Botanic Gardens. It agrees well with Baker's description in the Flora Capensis, except that its perianth-tube is very small. This is also the case with *A. picta*. Thunb. (see De Candolle, "Plantes Grasses," t 97), which Baker regards as a synonym of ***A. obscura***, Mill. It flowers in Grahamstown in November.

26 (314). *A. grandidentata*, Salm-Dyck.—A plant which I refer to this species was received by me from its native habitat some years ago, but I regret to say I cannot now find a record of where it came from. It may have come from Kimberley. The prickles on the margins of the leaves and the flowers are somewhat smaller than in the type. It flowers in Grahamstown in October.

27 (315). *A. Greenii*, Bak.—I owe specimens of this very handsome plant to Dr. MacOwan, F.L.S., who states that it comes from Natal. It flowers in Grahamstown in March and April. Its inflorescence reaches sometimes a height of 5 feet.

27A. *A. Grahami*, Schönl. n. sp. (Plate III, fig. 3). Stem, as far as known, about .45 cm. high; leaves comparatively thin, about 50 in a dense rosette, dark green with a narrow cartilaginous white margin, upper surface channelled, towards the tip subplicate and subcarinate, obscurely lineate, not spotted, lower surface lineate, and with interrupted rows of elongated whitish spots, lanceolate, or ensiform, up to 60 cm. long and 10 cm. wide at the base, suberect, recurved in the upper half; marginal prickles deltoid-lanceolate, whitish with brown tips, about 3 mm. long, at irregular intervals, more closely set at the base and towards the tips, up to 3 cm. distant in the centre, almost at right angles to the margin in the lower portion of the leaf, curved forward or even hooked in the upper portion; peduncle 60-90 cm. high, branched in the upper portion, branches laterally slightly compressed, deep green, with scattered empty ovato-cuspidate bracts; flowers in elongating racemes, numerous, closely set, slightly drooping when open, bracts whitish with pinkish base, subscarious, 7-nerved, ovato-cuspidate, the lowest nearly 2·5 cm. long, the upper slightly smaller; pedicels erecto-patent, the lower 5 cm. long, the upper gradually smaller; perianth 3·75 to 4·25 cm. long, outer petals red with brownish-

green tips, slightly glued to the inner to nearly half their length or sometimes free, inner petals with whitish margin and a broad red stripe in the centre, filaments bright yellow, anthers slightly exserted when shedding their pollen, style bright yellow, eventually exserted about 6 mm. It flowers in September.

I have named this species in honour of F. Graham, Esq., C.C. and R.M., who takes a great interest in Natural History pursuits, and to whom I owe a number of South African succulents.

The specimen from which the description was taken, was noticed by me in a private garden in Grahamstown, and is now in the Grahamstown Botanic Gardens. I could not ascertain where it came from. It is a very handsome species, its dark-green gracefully recurved leaves forming a fine contrast to the red flowers.

30 (315). *A. microstigma*, Salm-Dyck, var. (Plate III, fig. 1).—I first received this very fine plant from my friend, Mr. W. Armstrong of Port Elizabeth, who collected it in the Addo bush, where it forms a favorite food of the elephants, which still roam about in the Addo bush in considerable numbers. I have since seen numerous specimens procured by Mr. E. Tidmarsh, Curator of the Grahamstown Botanic Gardens, and Mr. J. G. Baker, F.R.S., has kindly confirmed my determination of this as of some other species. With us it only forms an elongated stem when grown in the shade. In the open it remains almost "stemless" and branches freely from the base. When grown in poor ground in the open the ground-colour of the leaves is a rusty-red, which becomes greener in better soil and quite green when grown in the shade.

It flowers in June. When looking at an inflorescence in which about half the flowers are open, one notices that the upper portion is red, while the lower portion is yellow. Examining a bud which is about to open one notices that it is red with dirty-green tip. The flower opens and becomes yellow and the inner whorl of stamens protrudes about $\frac{1}{8}''$. They shed their pollen and then the stamens of the outer whorl begin to take its place. By the time the outer whorl of stamens is withdrawn again, the style has come out.

34 (317). *A. tenuior*, Haw.—This species extends as far as Komgha (H. G. Flanagan, no. 1325). It flowers at irregular intervals (probably influenced by climatic conditions) almost all the year round in the neighbourhood of Grahamstown.

35 (318). *A. ciliaris*, Haw.—The typical *A. ciliaris* is not uncommon in the bush near Grahamstown, and is frequently grown in gardens. It flowers about October. Through Mr. E. Tidmarsh I received in 1900 a plant (grown in the garden of Lark's Hotel, close to Grahamstown, and probably derived from the immediate neighbourhood), which at first I was disposed to regard as a new species, but which may perhaps be better regarded as a variety of *A. ciliaris*. I append a description :—

*A. ciliaris Haw., var. Tidmarshi*, Schönl. nova var. Stem many yards long when fully developed, sarmentose, richly branched ; branches terete, about ¼in. diam., not striated, green ; leaves sheathing at base,[1] covering entirely the internodes, which are about ½inch long, sheaths light reddish or greenish, striped with the same tint, but darker ; leaves lanceolate acute, about 4in. long, concave, about 1½″ broad where the sheath begins, above with margins distinctly rolled in, texture somewhat firmer than in *A. ciliaris*, marginal teeth very minute, getting bigger lower down, but even then not longer than 1‴ on the sheath, and very thin there, which is in marked contrast with *A. ciliaris* ; inflorescence lateral, though subterminal ; peduncle compressed at base and with 2 opposite minute wings, about 8 in. long, and provided with 3 or 4 empty bacts ; raceme 4–6″ long, rather lax, pedicels about 8″ long, ascending, bracts narrow lanceolate, about half the length of the pedicels ; perianth almost cylindrical, gradually getting a little wider near the apex and with an almost imperceptible curvature, ⅞″ long, bright coral red with the exception of the segments which are pale greenish-yellow ; inner perianth leaves (as in A. ciliaris) quite free, spatulate, greenish-yellow at the tips, lighter towards the base ; filaments much more slender than in *A. ciliaris*. Stamens and style ultimately slightly exserted.

It will be seen that this variety, besides other differences from *A. ciliaris* is smaller in all parts and its leaf-bases are not decidedly ciliated.

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[1] It is strange that Mr. Baker has made no reference in the Flora Capensis to the leaf-sheaths, which are found well developed in *A. ciliaris* and allied species, but are also more or less indicated in so many others. This becomes sometimes misleading. For instance, with reference to *A. striatula* (Flora Cap. VI p. 318), it is stated that the internodes are conspicuously striped with green, whereas only the leaf-sheaths are striped and not the underlying internodes.

A second variety :

*A. ciliaris*, Haw., *var. Flanagani*, Schönl. nova var, has ovate-lanceolate leaves which are about 3" long and ¾" broad, the marginal teeth are as minute as in *var. Tidmarshi*, but the "cilia" on the sheath are larger. The flowers are of the same size as in the type.

Amongst shrubs near Komgha, H. G. Flanagan (no. 1326), Nov. 1892, alt. 1500'.

I am indebted to Mr. H. G. Flanagan, F.L.S., for the loan of this specimen.

36 (318). *A. striatula*, Haw.—I owe a live specimen of this plant to Mr. E. E. Galpin, F.L.S., who found it on mountain summits, near Queenstown. (Alt. 4300'—4900'—no. 2620). It flowers in November.

Dr. P. MacOwan, F.L.S., agrees with me that

38 (319). *A. MacOwani*, Bak. cannot be separated from *A. striatula*, Haw.

The original plant from the Somerset East District is still growing in the Capetown Botanic Gardens.

47 (321). *A. succotrina*, Lam. This species is not known to me, but if the published illustrations and descriptions are correct, then at least 2 species have been mixed up under this name. Leaving out Bot. Mag. t. 472, which is evidently a very bad figure, we find that in D.C. *Plantes Grasses*, t. 85, the perianth is cylindrical, whereas in Salm-Dyck, *Aloe* sect. xxii, fig. 1, it is distinctly constricted above the base, the sterile bracts in the former are ovate-oblong, mucronate, in the latter semi-amplexicaul lanceolate-acute and with eroso-dentate margin, &c.

48 (322). *A. purpurascens*, Haw.—I have identified with this species a plant from False Bay which I received from Dr. H. Becker, F.L. S., F.S.A., and this determination has been confirmed by Mr. J. G. Baker, F.R.S. It flowers in Grahamstown in July. The perianth is slightly curved and somewhat constricted towards the middle. The outer petals are united at the base, red tipped with dark green, the inner quite free, very pale red, keeled with same colour as outer and with bright green tips.

49 (322). *A. arborescens*, Mill.—This species again is not known to me for certain at present. Unfortunately there are

again some discrepancies between De Candolle's (*Pl. Grasses* t. 38) and Salm-Dyck's (*Aloe*, sect. xxvi, fig. 3) figures which make identification very difficult.

Until recently the following species :—

49A. *A. natalensis*, Wood et Evans (Report, Natal Botanic Gardens 1900, Journ. of Bot. 1901, and Wood in "Natal Plants" Plate 258) was taken for it by various South African Botanists, and a dried specimen which I submitted to Mr. J. G. Baker, F.R.S., was doubtfully referred by him to it, but its characteristic mode of copious branching makes it quite distinct, besides the shape of the corolla is different from the published figures of *Aloe arborescens*, it being somewhat constricted above the base in *A. natalensis*, whereas in the former it is decidedly cylindrical. This plant is a favourite in Capetown and Grahamstown gardens, where it flowers profusely in midwinter—Flanagan, no. 1790, rocky slopes near Komgha, June '93, alt. 1000', belongs to this species.

50 (522). *A. pluridens*, Haw.—This is another plant which has frequently been taken for *A. arborescens*. It grows in various localities on stony ridges near Grahamstown, and flowers in midwinter. My specimens agree with MacOwan no. 1825, in the Cape Government Herbarium, and my determination has been confirmed by Mr. J. G. Baker. With us, however, the perianth is not quite cylindrical, but somewhat constricted above the middle, further it is not yellowish-red, but the visible parts are deep red, tipped with dirty green, the covered parts of the inner petals being pale red. The outer petals are united at the base, the inner are free. The prickles on the margins of the leaves are white. The surfaces of the leaves, especially the lower ones, are indistinctly striate. The stem is frequently branched from the base, very rarely higher up.

*A. pluridens*, Haw, *var. Beckeri*, Schönl n. var. Leaves thinner than in *A. pluridens*, more decidedly striate, the striae distinctly raised, forming a series of low longitudinal ridges. The marginal spines are a little further apart than in the type and a little smaller. Stem, bracts, flowers, &c., very much as in the type, but inflorescence with fewer flowers and not so dense. Flowers in midwinter.—This variety was received by Dr. H. Becker, F.L.S., F.S.A., from Mauritius, but he has reason to believe that it was taken there originally from South Africa. With reference to a

dried specimen sent to Mr. J. G. Baker, F.R.S., he writes: "Is not this *arborescens*?" but again its flowers are quite different from the published figures of this species, besides the leaves are pale to dark green, never glaucous and their prickles are not close-set.

51 (323). *A. speciosa*, Bak. This species is common in the Addo Bush. It is also found in the Kowie bush, near Alicedale, &c. It flowers in August and September. In shape and general structure of flower it is very close to *A. ferox*, with which it should be united in one group. When in bud, the perianth is reddish-pink with longitudinal greenish lines. When the flower opens, the outer petals, which form a short tube, are white with green lines, the inner, which are free, are white with three green lines through the centre.

54A. In the Kew Bulletin (1901, p. 135), Mr. Baker describes a new species *A. Galpini*, Bak. (Mountain sides, Queenstown, Galpin, 2335), which he says is allied to 54 (324) *A. platylepis*, Bak. I do not know either of these species, but a photograph of living plants of *A. Galpini*, Bak., which I owe to Dr. R. Marloth, looks very much like *A. ferox*, and Mr. E. E. Galpin, F.L.S., writes that he compared plants from Grahamstown (which are undoubtedly *A. ferox*), and he cannot find any difference. *A. Galpini*, Bak., should therefore be considered a synonym of *A. ferox*.

55 (324). *A. fulgens*, Todaro.—Mr. Alwin Berger of La Mortola, Ventimiglio, Italy, informs me that this species is identical with

57 (325) *A. Salm-Dyckiana*, Schult. fil., which I only know from plants grown in the Capetown Botanic Garden. It flowers in July.

59 (325). *A. dichotoma*, L.f.—Fine specimens of this striking species, the "Koekerboem" of Namaqualand, are growing in the Capetown Municipal Garden. Flowers and leaves are represented in the Herbarium of the Albany Museum by MacOwan and Bolus' Herb. Norm., no. 800, which was collected in June, 1887, near O'okiep at an altitude of 3000'.

60 (326). *A. Bainesii*, Dyer.—This species, the giant among the *Aloes*, is frequently grown in Grahamstown gardens, where, in some instances, it has, though a slow grower, attained magnificent

proportions. It does not seem to flower until it has reached a considerable age, but afterwards it flowers every year. The type is represented in the Herbarium of the Albany Museum by a specimen from woods near Komgha, collected in Oct., 1892, by Mr. H. G. Flanagan (no. 1329). With us and in Capetown the type and the *var. Barberae* flower in June and July. To the description in the Flora Capensis I have to add that, though the outer petals form a tube which is about half the length of the perianth, the inner are free. The peduncle is frequently branched.

61A. *A. Schlechteri*, Schönl. n. sp. Habit of growth not known; leaf-blade unspotted, falcate, olivaceous (in the dried specimen), fuscous at the base, 20 cm. long, 3·5 cm. broad at the base, margin with deltoid—cuspidate brown horny prickles about 2 mm. long; peduncle (as far as known) simple, short, with numerous sterile membranous lanceolate cuspidate bracts, the lowest 2·2 cm. long, getting gradually shorter higher up; racemes dense, 13-16 cm. long; pedicels ascending about 6 mm. long; bracts lanceolate-cuspidate about 18 mm. long; perianth campanulate, contracted near the base, tube c. 2 cm. long, lobes oblong c. 1·3 cm. long, petals very light yellow (?) with 3 longitudinal dark veins in the centre, inner with brown tips; filaments and style flattened, anthers brown; stamens and style finally exserted about 1 cm.

Pella, Great Bushmanland, 16. I. 98, Max Schlechter no. 133. Described from 1 leaf and 2 inflorescences in Herb. Albany Museum.

I thought at first this might be *A. falcata*, Bak. which I only know from the description, but the campanulate flowers separate it from this as from all other described species. The long bracts also distinguish it from *A. falcata*.

62. (326). *A. ferox*, Mill.—This species is mentioned by Pappe as occurring near Swellendam and grows in millions in the Eastern Province of Cape Colony, going beyond Cookhouse to the North and also as far as Queenstown (see *A. Galpini*, Bak. 51A). To the East it goes at least as far as Natal. It flowers in midwinter and beautifies the landscape at a time when other flowers are scarce. With this wide distribution it is natural that we should find numerous slight variations from the type which show themselves chiefly in the numbers and distribution of the prickles on the leaves, and the

size and colour of the corolla. Thus the *var. incurvata* Bak. can be produced by growing seedlings of the typical form in the shade, the *var. subferox*, Spreng, is met with near Grahamstown mixed with the more prickly form. I have already stated my belief (on page 44) that *A. Galpini*, Bak. must be referred to this, and I think *A. supralaevis*, Haw, must also be looked upon as one of its varieties. Though the Flora Capensis states that the leaves of *A. supralaevis*, are ensiform, this statement is scarcely borne out by Salm-Dyck's illustration (*Aloe*, sect. xxvii, fig. 6). The slight twist in the older leaves which make them appear sub ensiform can also be noticed in *A. ferox*, Mill. There remains only the smaller size of the flowers which, however, can scarcely be looked upon as a specific distinction. The flowers of *A. ferox*, Mill. are near Grahamstown usually red, but sometimes yellow and some received from Uitenhage were cream-coloured.

63 (327). *A. africana*, Mill.—This species is not uncommon near Grahamstown, and extends almost to the level of the sea near Port Alfred. It flowers in midwinter. Though the flowers are usually yellow, I have noticed some plants with red flower-buds. The tube in our specimens is $\frac{3}{4}$ the length of the perianth. Though the leaves are usually as described in the *Flora Capensis*, one frequently meets specimens which are very prickly both on the face and the back, and this happens to be the case with most of the specimens cultivated in Grahamstown, while amongst the cultivated specimens of *A. ferox*, Mill, the leaves have usually only very few prickles on the back and none on the face. This, however, is due to selection and not to the effects of cultivation. I must express my surprise that in the *Flora Capensis*, *A. africana* is placed between *A. ferox* and *A. supralaevis*. The latter, to say the least, are very closely allied and have not the curved corolla of *A. africana*. The key on p. 304 should therefore be slightly amended. I may take this opportunity of stating, that in some other places it is also somewhat misleading.

65 (327). *A. rupestris*, Bak.—Fine specimens of this species are growing in the Capetown Municipal Gardens. They are said to have originally come from Namaqualand.

66. (328). *A. variegata*, L.—This old favourite of European gardens is represented in the Herb. of the Albany Museum from Sheldon, Cape Colony, where it is common. It seems to be

widely distributed in the Eastern Karroo. It flowers during the greater part of the winter.

68 (327). *A. plicatilis*, Mill.—This is represented in the Herbarium of the Albany Museum by an incomplete inflorescence collected by *MacOwan* (Nieuwekloof, Tulbagh, Oct. 1890, c. 850′, no. 2259, Herb. Austr. Afr. 1554.)

(*To be continued*).

**Explanation of Plate III.**

Illustrating Dr. Schönland's paper "On some South African species of *Aloe*." Fig 1 and 2a are from photographs, the others from drawings by the author.

Fig 1.—*A. microstigma*, Salm-Dyck, var. About ⅛ natural size.

Fig 2*a*.—*A. Schönlandi*, Bak; about ⅓ natural size. 2*b* Subcarinate tip of young leaf; twice natural size. 2*c*. A portion of the margin of an old leaf; natural size. 2*d*. Open flower; natural size. 2*e*. Flower-bud; natural size.

Fig. 3.—*A. Grahami*, Schönl. n. sp. *a*. Portion of the margin of middle position of a leaf. *b*. Flower open. *c* Flower-bud. All natural size.

On some new and some little-known species of South African plants.—By Dr. S. SCHÖNLAND, Hon. M.A. Oxon.

*Scilla* (sect. *Ledebouria*) *hypoxidioides*, Schönl., n. sp.—Bulb ovoid, tunicated, 3–4 cm. in diameter, tunics brown, membranous; leaves contemporaneous with the flowers, 4—6 in number, up to 11 cm. long, ovate-lanceolate, acute, sheathing at the base; sheath glabrous, whitish inside, purplish outside; lamina unspotted, green, or fairly spotted with darkgreen, covered on both surfacesand along the margin with a dense indumentum composed of soft white hairs; 1 or two inflorescences to each bulb; peduncle glabrous, more or less curved, 5—12 cm. long, pale green near the base, blotched with dark red higher up, with one or more longitudinal furrows, somewhat flattened on one side; raceme dense at first, later rather loose, 4—12 cm. long, 2—3 cm. wide; bracts minute, lanceolate; pedicels slender, spreading, curved downwards, perianth in bud oblong, constricted above the base; petalsin the open flower dark green with lighter margins, lanceolate with cucullate apex, about 5 mm. long, of which a little over $\frac{1}{3}$ is upright, the remainder spreading: stamens inserted a little above the base of the petals, and a little shorter than these; filaments slightly flattened, subulate: anthers broadly oblong, versatile; pollen pale yellow; ovary shortly stipitate, minutely hairy, subsemiglobose, deeply 6 lobed, lobes rounded at the back; style filamentous, dark violet; stigma 3-lobed; capsule pale straw-coloured, surrounded by the persistent petals, 3-(or more frequently) 2-merous, loculicidal; seeds 1 or 2 in each cell, reddish brown, strongly wrinkled.

Grahamstown, Jan. 1903, Miss M. Daly and Miss M. Sole, no. 435. —This species was since its first discovery, only a few months ago, found by Miss Daly and Miss Sole in several places all round Grahamstown. It grows amongst grass and also in rocky situations at an altitude of about 1700'—2300'. Its silky-haired leaves resemble those of some species of *Hypoxis*, which are very common here, and for this reason it had probably been hitherto overlooked.

*Nerine Huttonii*, Schönl. n. sp.—Bulb ovoid, 4 cm. in diameter, tunics pale brown ; leaves contemporaneous with the flowers, about 9, subdistichous, strap-shaped, thin, slightly channelled above, minutely but closely ribbed, bright green, finally about 25 cm. long, 1·5 cm. broad, apex rounded, obtuse ; peduncle green, about 15 cm. long, nearly 1 cm. broad, quite flat on one side, slightly rounded on the opposite one ; umbel 22-flowered ; spathe-valves ovato-cuspidate, 3·5 cm. long ; bracts, from a deltoid base, setaceous, twisted, c. 3 cm. long ; pedicels slightly flattened on one side, straight except at the tip, c. 8 cm. long ; ovary sub-globose-trigonous, few-ovuled ; perianth 3.2 cm. long, cut down nearly to the ovary, segments pale-pink, with dark red centre, oblanceolate, slightly crisped ; stamens attached to the base of the perianth, filaments red with a small dorsal white appendage at the base which projects slightly laterally, at first straight, later curved upwards, anthers brown, pollen grey ; style red, following the stamens in the upward bend when the pollen is shed ; capsule ?

I ripened some seeds by placing some cut flowers in water. They were as large as peas, nearly globular with smooth surface. They were surrounded by a thin membranous pericarp which is not likely to have been normal.

Described from a specimen, which flowered in the Albany Museum grounds, Feb. 1903. Bulb collected by Mrs. C. Hutton, Sheldon, Cape Colony.

*Dioscorea Tysonii*, Schönl. n. sp.—Stem slender, scrambling, glabrous, laxly leafy throughout ; leaves glabrous, entire, petiolate, alternate or sometimes opposite on the same branch ; petiole about 12 mm. long, slightly broadened at the base ; lamina in the upper leaves about 2·5 cm. long, in the lower up to 7·5 cm. long, ovate or ovate-lanceolate, mucronate, but not cordate at the base, with 5 (or in the larger leaves 7) somewhat prominent longitudinal nerves which do not anastomose as in *D. Burchellii*. Male flowers in axillary subspicate panicles, which are about 2·5 cm. long some distance from the apex of the flowering shoots and become depauperated above, otherwise almost as in *D. Burchellii*.

Female flower and fruit unknown.

"Ad margines sylvarum montium Zuurberg, Griqualand Orientalis, alt. 4500'." Leg. W. Tyson, no. 1829, Dec., 1883.

The above description was taken from some branches in the Cape Government Herbarium which are about 50 cm. long. It

appears from these that the plant is not such an evident climber as *D. Burchellii.* A piece in the Herbarium of the Albany Museum, communicated by Dr. MacOwan, F.L.S. is nearly straight. Its length is 23 cm.

*Anacampseros papyracea*, E. Mey. We owe to Dr. P. MacOwan some of Zeyher's specimens, which were collected on the Gamkas river. It seems to be fairly common in the Western Karroo. I have grown for about four years some specimens from Namaqualand, which were sent to me by Mr. G. Alston. In cultivation the stems frequently reach a length of 8 cm. (over 3 inches). All my specimens differed by having somewhat broader stipules than Zeyher's specimens; they were broadly obovate instead of linguiform; the leaves were reniform, green, almost flat on the face, convex on the back, and about $\frac{1}{3}$ the length of the stipules; the petals were pale green, not yellow; the sepals are also pale green. Whether these characters constitute specific differences remains to be seen. I am inclined to think that the length of the leaves, and the colour of the flowers as stated in the Flora Capensis is due to a mistake owing to dry material having been used for description. There are 16 stamens (apparently in one whorl) which are attached to the base of the petals and to one another. Filaments subulate, slightly broadened at the base. Anthers oblong, sagittate at the base. Pollen large and not produced in great abundance. Ovary globose, green; style and stigmata white; style very short, broad, with 3 sub-lanceolate stigmata. Placenta central, attached to the upper roof of the ovary, ovules very numerous. Capsule and seeds very much the same as in allied spicies.

It is stated in the *Flora Capensis* (II, p. 383) that the flowers are included in the uppermost stipules. I have watched this plant carefully now for some years, and I have never seen it leaving these stipules which cover it up closely, so that any cross-fertilisation is impossible, but the petals also never open out. Yet fertile seeds are produced in abundance. *A. papyracea* has, therefore, cleistogamous flowers and, as far as I know, *it is the only plant which, besides the cleistogamous, never produces open flowers.* After fertilisation, the petiole elongates slightly, so that at last the capsule gets quite clear of the uppermost stipules, and is able to shed its seeds. The stipules which, when fully developed, consist only of dead tissue, form an excellent pro-

tection of the leaves and stem against excessive transpiration. In damp weather they open out slightly. Experiments to show whether through them the plant can utilise the dew had negative results.

*Anacampseros* (*Avonia*) *Alstonii*, Schönl. n. sp. Caudex napiform, 2-4 cm. long, 2-3 cm. broad at the apex, almost flat on the top; branches numerous, only from the upper surface of the caudex, up to 2 or 3 cm. long, nearly 2 mm. broad, leaves (and stipules) in 5 orthosticha; leaves closely imbricated, about 1 ¾ mm. broad, 1 mm. high, convex on the back, rounded and sub-emarginate at the apex, glabrous, smooth, green with a tinge of red, or intensely red; stipules scarious, scabrous on the margin, silvery white, closely imbricated in the lower part of the branches, more laxly imbricated towards the apex, deltoid, about 2 mm. long, about 1½ mm. broad at the base, apex blunt; involucral scales 5-8, 10 mm. long, sub-ovate, acuminate; flowers single, terminal; sepals broadly ovate, boatshaped, ochraceous, nearly 1 cm. long; petals broadly obovate, white, about 15 mm. long; stamens numerous (60 or more), filaments slender, white, 10-12 mm. long; anthers oblong, pollen yellow; ovary globose, 2 mm. long and broad, style slender, about 10 mm. long, stigma sub-globose, 3-parted, ovules numerous, placentation central; capsule about 7 mm. long, outer coat splitting into 6 lobes from the base as far as the middle, these lobes are again shortly bifid and become detached at their base, the inner portion, consisting of 6 fibrous oblong lobes and and a fibre between each 2 lobes, remains and allows the seeds gradually to escape; seeds minute, numerous, yellowish-brown, subclaviform.

Described from living specimens which were contributed about 4 years ago by Mr. G. Alston, and collected by him at Hondeklip Bay, Namaqualand. It flowers in Grahamstown in January.

*A. Alstonii* is evidently closely allied to *A. quinaria*, E. Mey.— This latter species has, however, a much divided caudex. broad ovate stipules and purple flowers, which are only about three lines long.

In *A. Alstonii*, as in all other species of *Anacampseros*, the flowers are very fugaceous. They open for a couple of hours some sunny afternoon and never open again. Those belonging to one caudex may open all together or a few may open at a time. In some instances, which were specially watched, no insect-fertilisation

could have taken place, and yet capsules and seeds were produced.

*Self-fertilisation is therefore possible, as in all other species of Anacampseros*, and is, I think, *the rule* in all of them, even in the species with showy flowers. Accurate observations in their native habitats are, however, very desirable. As far as my observations go, the beautiful show-apparatus of the flower in this and other species is solely used by the plant to press the anthers against the stigma when the flower closes again. It takes over 6 weeks from the time the flower has opened, until the capsule is ready to shed the ripe seeds. Just before this takes place, the upper internodes of the flowering branches elongate to quite twice their original size or even more, the stipules and involucral leaves become patent, instead of being closely appressed.

A fifth species of *Anacampseros* belonging to the section *Avonia* was sent to me by Mr. G. Alston some years ago, but it has never flowered yet. Its leaves and stipules are multifarious. Its caudex is branched after the manner of *A. ustulata*. The leaves are imbricated, green, semicircular in outline, convex on the back, flat on the face, about 2 mm. broad, 1 mm. high, the stipules are lanceolate, about 3 mm. long, not imbricate, curved outwards in the upper portion, scarious with a broad, median, pale yellowish-green line.

As these characters distinguish it from all other known species of *Anacampseros*, I venture to give it a specific name and call it *Anacampseros (Avonia) recurvata*, Schönl. n. sp.

*Anacampseros ustulata*, E. Mey. (Flora Capensis, II, p. 383).—This species appears to be fairly common on the mountains of the Eastern Karroo, and extends towards the East to the Stormberg range, whence I received live specimens from Mr. T. R. Sim, F.L.S., who also sent it from the neighbourhood of Naauwpoort. I find that the flowers are somewhat larger than the involucre, not equalling it, as stated in the Flora Capensis; the petals are white, obovate, slightly recurved at the apex. There are eight stamens, 5 alternating with the petals, and 3 belonging to an epipetalous incomplete whorl; the filaments are subulate, the anthers oblong. The stamens are all placed with the petals on a disc, which surrounds a depression in which the ovary is sunk to about half its length. The ovary is nearly globose, the style cylindrical, the stigma 3-branched. The placentation, is free-central (without any connection with the wall of the ovary above. This observation

requires, however, to be checked), the ovules are fairly numerous. The capsule is very much the same as in other species of *Anacampseros*, the seeds are obliquely subclavate. The flowers open for a few hours (in April and May) and never open again. They are self-fertile and produce abundant ripe seeds. In the seedling the two cotyledons are subsemiglobose, and dark reddish-brown in colour. The caudex takes its origin in the first place from the hypocotyle. The two first leaves are opposite, but already the next ones begin to form a $\frac{2}{5}$ spiral. The stipules are found already in the very first leaves after the cotyledons. They arise from the primordia of the leaves on their inner faces at a very early stage. In a case which I particularly studied, the stipule of the 5th leaf was just visible from above, when the primordium of the 10th leaf had just appeared. They are about $\frac{1}{4}$ the thickness of the leaves and have at first the same breadth, but they very quickly increase in breadth.

*Anacampseros filamentosa*, Sims.—I have had this species from Sheldon (Mrs. C. Hutton, no. 496) and from Barkly West (W. G. Bennie no. 671). In tracing the development of the so-called stipules in this species, I found that they arise from the base of the primordia of the leaves on their inner sides as small protuberances on which at an early stage trichomes are developed.

The number of stamens is usually about 15. The seeds are obliquely club-shaped, as in all other species of *Anacampseros*. The outer portion of the pericarp becomes detached in the form of a conical cap which is split below into 6 parts, rounded at the base.

*Anacampseros arachnoides*, Sims.—I have seen live specimens of this species from Namaqualand and the Fish River Randt. It is, as will be seen from the Flora Capensis (II, p. 384), a rather variable plant. I find that the number of stamens is usually 27. The ovary is rather more elongated than in the other species of *Anacampseros* which I have mentioned, and this is also the case with the stigmatic lobes. The placentation is central, the placenta being distinctly connected with the ovary above. The capsule and seeds are very much the same as in *A. filamentosa*, but in the latter the seeds are covered all over with shallow rounded protruberances, while in *A. arachnoides* these are decidly semi-globose. This may have given rise to the statement in the *Flora Capensis* and elsewhere that the seed are winged, which is not the case.

*Anacampseros lanigera*, Burch. is represented in the Herbarium of the Albany Museum by some specimens collected by Dr. MacOwan amongst rocks of the mountains near Pakhuis, Clanwilliam district, October 1897, alt. c. 2000′, Herb. Aust. Afric. no. 1807.

*Crassula nitida*, Schönl. n. sp. A richly branched glabrous shrub, sometimes 2–3 m. high; stem greyish, fleshy, subterete, annulate, up to 10 cm. thick below; leaf-bearing branches about 8 mm. thick, internodes about 10 mm. long, getting gradually smaller towards the apex: young leaves subconnate, but separated later on, obovate-spathulate, subacute, sometimes mucronulate, shining green ("varnished"), sparsely punctate in the upper half near the margin which is there of a reddish colour, slightly concave on the back, slightly convex on the face, about 4 cm. long and 2 cm. broad; flowers in terminal, shortly pedunculate, subcorymbose, multiflowered cymes: calyx-lobes deltoid, 1·5 mm. long and about as broad at the base, rounded on the back and separated by rounded interspaces; petals white (or rarely faintly rose-coloured), c. 7 mm. long, spreading, slightly connate at base, lanceolate, dorsally behind the apex mucronate; stamens nearly the size of the petals, filaments filiform, white, anthers ovate, rose-coloured; carpels white, nearly the length of the stamens, style filiform, slightly shorter than the obliquely ovate ovaries, squamae very small, whitish at the base rose-coloured towards the apex, slightly emarginate on the top and rounded at the corners, nearly four times broader than high.

This is the common arborescent *Crassula* near Grahamstown, where it grows (especially towards the Fish River), in dry rocky situations at an altitude of from 1300′–2700′. It flowers in winter from May onwards.

I have myself hitherto looked upon this plant as *C. portulacea*, Lam., but it is, I think, sufficiently distinct. In any case if we place it with *Cr. portulacea* we must on even better grounds unite *Cr. Cotyledon*, L. (= *Cr. arborescens*, Willd.) with the latter, and few Botanists would agree that this should be done. The following key gives the most striking differences by which they may be separated from one another.

A. Flowers usually pale red, petals about 10 mm. long.

1. Leaves broadly obovate, glaucous, copiously and conspicuously punctate above, usually about 6·5 cm. long. *C. Cotelydon*, L.

2. Leaves pale-green shining or glaucous, obliquely obovate, sparsely punctate above, comparatively narrower than in the preceding species, about 5·5 cm. long.
*C. portulacea*, Lam.

B. Flowers usually white, petals about 7 mm. long, young leaves green, shining, very sparsely punctate within the margin, 3·5–4 cm. long. *C. nitida*, Schönl.

*Cr. Cotyledon*, L., though cultivated in Europe as far back as 1739 (*vide* Bot. Mag. t. 384), is unknown in its wild state. At all events it seems doubtful whether E. & Z. no. 1875 from Uitenhage can be referred to it. The plant figured by De Candolle (Pl. Grasses t. 79) seems also to be unknown wild, but is probably derived from a glaucous-leaved form which I received some time ago from the neighbourhood of Kingwilliamstown, and to which Galpin no. 1533 from mountain-tops near Queenstown (alt. 4000′) is also to be referred. A plant from Graaff Reinet (Rattray no. 68) belongs evidently to our *Cr. nitida*.

*Crassula albanensis*, Schönl. n. sp. Herbaceous, perennial, about 15 cm. high, stem simple; leaves radical, subrosulate, spreading, lanceolate, subacute, 3–6 cm. long, papillose on back and face, margin cartilagineo-ciliate towards the base, papillose higher up; peduncle simple or branched, pale green, papillose, bearing 4–8 pairs of bracts which resemble the foliage leaves but are much smaller and somewhat broader and bearing in their axils capitato-fasciculate sessile cymules which are as a rule shorter than the bracts; calyx nearly 2·5 mm. long, lobes broadly lanceolate, 1½ mm. long, papillose on back and margin; petals connivent, connate at the base, oblong, concave, dorsally below the apex with a globose "mucro," creamy white, 3 mm. long; stamens attached to the corolla-tube, about the size of the petals, filaments subulate, anthers ovate; carpels about ½ the length of the petals, ovary obliquely ovate, stigma subsessile, squamae small, orange-coloured, transversely oblong, emarginate above.

Common on the Grahamstown flats, especially among coarse grass, alt. c. 1900′. Flowers in October. S. Schönland, no. 616; Miss M. Daly and Miss M. Sole, no. 335.

Perhaps even more than *Cr. Turrita*, Thunb., this species approaches the subgenus *Globulea* very closely, and the structure of the flower in this and some allied species gives us a clue how the peculiar, permanently closed flowers of *Globulea* (see Schön-

land in *Trans. S. A. Phil.* Soc., vol. IX, p. 33) have been evolved. It is worthy of note that in *Cr. corymbulosa*, Link, which also comes very close to *Cr. Turrita*, Thunb., the flowers are quite open, the petals being recurved.

*Crassula nodulosa*, Schönl. n. sp. Herbaceous, perennial, 35–40 cm. high, stem covered with a short dense fulvous indument, upright, only branched from the base, with only a few radical leaves and 8 or 9 stem leaves which are followed by 30 or more bracts bearing capitate cymules in their axils; leaves sessile, lowest about 4 cm. long, obovate-spathulate, subacute, subglabrous, margin cartilagineo-ciliate, higher up the leaves are ovate-acute and pass gradually into the bracts which are broadly ovate-acute and scabrid on the back with a ciliate margin; the lowest bracts about 1 cm. long, exceed the cymules in length, but they get gradually smaller and about midway in the floral region the cymules begin to exceed them in length; internodes getting very gradually smaller (lowest 1·5 cm. long, lowest in the floral region c. 1 cm.) until near the apex the cymules touch one another; calyx nearly 2·5 mm. long, lobes c. 1·5 mm. long, broadly lanceolate, acute, dorsally papillose, irregularly ciliolate on the margin; petals upright, ovate, connate at the base, white, 3 mm. long, with a small cylindrical "mucro" dorsally below the apex; stamens attached to the corolla-tube, nearly as long as the petals, filaments subulate, anthers ovate; carpels about $\frac{2}{3}$ the length of the petals, ovary obliquely ovate, style distinct though short, squamae small, cuneate, subtruncate above, membranous, deep orange-coloured.

Warrenton, Miss C. Adams, no. 28, Apr. 1902.

This species comes very close to *Cr. Turrita*, Thunb.

The following table will show the relations between *Crassula Turrita*, Thunb., and the two species just described :

| *Cr. Turrita*, Thunb. | *Cr. albanensis*, Schönl. | *Cr. nodulosa*, Schönl. |
|---|---|---|
| Leaves glabrous, cartilagineo-ciliate. | Leaves ciliate only in lower part, otherwise papillose all over. | Leaves subglabrous, ciliate. |
| Stem and peduncle glabrous or subglabrous. | Stem and peduncle papillose. | Stem and peduncle covered with dense tulvous pubescence. |
| Thyrsus normally unbranched. | Thyrsus frequently branched. | Thyrsus unbranched. |
| Calyx-lobes glabrous | Calyx-lobes papillose on back and margin. | Calyx-lobes papillose on the back, ciliate on the margin. |
| Stigma subsessile. | Stigma subsessile. | Style small but distinctly developed. |
| Squamae cuneate, more or less deeply emarginate above. | Squamae transversely oblong, emarginate above. | Squamae cuneate, subtruncate. |

*Crassula quadrangularis*, Schönl. n. sp. Herbaceous, perennial; stem very short, richly branched from the base only, with 5 or 6 pairs of foliage leaves forming a dense rosette which is sharply four angled ; leaves connate, 10 mm. long below, getting gradually smaller upwards, green, punctate above, sharply folded lengthwise, broadly ovate acuminate, glabrous on back and face, retrorsely cartilagineo-ciliate on the margins; inflorescence terminal, few-flowered, subcapitate, pedunculate ; peduncle red, 2·5-3 cm. long, with 3 pairs of ovate, blunt, ciliate, sterile bracts which are 2-3 mm. long; flowers shortly pedicillate with oblong ciliate bracteoles ; sepals almost free, c. 1·5 mm. long, lanceolate, subcarinate, ciliate on the back and margin ; corolla campanulate, petals white, nearly free, c. 2·5 mm. long, oblong, dorsally with a short cylindrical mucro below the apex, spreading and recurved in the upper portion ; stamens about the size of the calyx, filaments subulate, anthers ovate ; carpels about $\frac{2}{3}$ the length of the stamens, ovary obliquely ovate, style very short but distinct, squamae obcordate-spathulate, about $\frac{1}{3}$ the length of the ovary, slightly folded lengthwise, yellow.

Laingsburg, July 1902, Dr. R. Marloth, no. 2512. Flowered in Grahamstown, Oct., 1902.

This species should be placed in the sect. *Rosulares*, the character of which will have to be somewhat modified. It is evidently

allied to *Cr. orbicularis*, from which, however, it is distinguished by its broadly ovate, acuminate, folded leaves and many other characters.

*Crassula (Bulliarda) limosa*, Schönl. n. sp.—Small, much branched, glabrous annual, only a few cm. high; stem and branches filiform, frequently rooting at the nodes; lower internodes 5-8 mm. long, upper much shortened; leaves ovate or obovate, lower distinctly, though shortly, petiolate, upper almost sessile; lamina 1½-3 mm. long; flowers single, terminal; pedicels slender, about twice the length of the leaves; calyx-lobes narrow, obovate with wide rounded interspaces, about 1½ mm. long; petals pale pink, smaller than the sepals, broadly ovate, connate at the base; stamens not much more than half the length of the petals, filaments subulate, anthers ovate; ovary several-ovuled, style short, subulate; squamae broadly flabelliform, rounded above.

In mud; water-pans, summit of Andriesberg, alt. 6700', E. E. Galpin, no. 1922, Dec. 1st, 1901.

This species is closely allied to *Cr. alpina*, Endl. and *Cr. papillosa*, Schönl. et Bak. fil. It can easily be distinguished from these through its perfectly glabrous leaves and sepals and the shorter petals. A plant from the same locality, collected Ap. 1895, was distributed under the same number by Mr. Galpin. It is, however, not the same. It is either closely allied, or even identical with *Cr.* (*Bulliarda*) *Vaillantii*, D.C.

*Crassula* (*Pyramidella*) *pachyphylla*, Schönl. n. sp. Stem suffruticose, simple. erect or decumbent, glabrous, efoliate below (when old), densely imbricated above, up to 18 cm. long; leaves connate, glaucous, very thick, ovate, very convex on the back, nearly flat above, laterally compressed towards the apex, glabrous except the margin of the sheath which is ciliate, the lowest and largest c. 3 cm. long, 1 cm. thick, very gradually becoming smaller further up; inflorescence cymose, densely capitate many flowered, sessile or subsessile, involucrate; sepals connate, tube c. 2 mm long, lobes c. 3 mm. long, nearly strapshaped, rounded above, with ciliate and hyaline margin; petals cream-coloured, connate to over ⅓ of their length, tapering above into long lanceolate, channelled points, about 12 mm. long; stamens attached to corolla-tube, filaments short, filiform anthers oblong; carpels obliquely ovate, c. 4 mm. long, ciliate above on inside margin;

stigma subsessile ; squamae c. 1½ mm. long, cuneate stipitate, rounded above, thin, greenish-yellow.

Laingsburg, Dr. R. Marloth, no. 2514, VII., 02 ; Matjesfontein, Dr. P. MacOwan.

The shape of the leaves distinguishes this species sufficiently from *Cr. columnaris*, Thunb. The differences in floral structure, though unmistakable, are slight.

*Cotyledon Bolusii*, Schönl. n. sp. Whole plant glabrous (except the throat of the corolla) ; stem elongated, upright, leafy, 10–12 cm. long, upper internodes very short and leaves consequently rosulate at the apex of the stem : leaves spathulate, rotundate or pointed at the apex, sometimes considerably broadened at the base, 2½–4 cm. long, ·8-2 cm. broad in the upper portion ; peduncle terminal, simple, about 12 cm. long, provided with a few minute acuminate sterile bracts, raceme simple, terminal, 5·5 cm. long, bracts none or deciduous (?) : flowers erecto-patent, pedicels 6–7 mm. long, tube of calyx very short, lobes ovato-acuminate c. 3 mm. long, corolla subcylindrical, with five longitudinal furrows, slightly constricted in the middle, tube c. 6 mm. long lobes ovate, submucronate, about as long as the tube ; anthers minutely apiculate. Squamae minute, broadly cuneate.

Bolus no. 8648, "juxta litus maris, Mossel Bay, infra 100'" 10th Jan , 1897.

This very distinct species belonging to the sect. "Spicatae" is only known from one flowering specimen and a leafy stem with only a portion of the peduncle, both in the Herbarium of Dr. H. Bolus, F.L.S. The flowers are not opened yet, and the above description will therefore have to be supplemented when fully developed flowers are known.

The elongated stem and the comparatively large corolla lobes distinguish it from allied species. I only noticed lately that in *C. rhombifolia*, Haw, *C. mammilaris*, L. and in *C. maculata*, Salm-Dyck the anthers are also minutely apiculate. This character should be looked for also in the other allied species.

*Cotyledon Marlothii*, Schönl. n. sp. A very distinct new species of the section "Spicatae" with oblong leaves which are almost or quite circular in transverse section.

Stem short, leafy, about 4 cm. high, ascending and branched from the base, internodes 2-10 mm. long; leaves scattered, divergence ½, glaucous, oblong, obtuse, nearly circular in transverse section and tapering at base (subpetiolate): peduncle terminal, simple, about 16 cm. long, with about 6 very short sterile bracts false spike terminal about 5-6 cm. long; bracts lanceolate, c. 1·5 mm. long, strongly convex on the back; flowers sub-sessile, erecto-patent: calyx green, 3 mm. long, lobes flat, broadly lanceolate with rounded interspaces, a little over 1 mm. long; corolla tubular, tube slightly curved, about 12 mm. long, greenish with a tinge of purple, upper part (about 2 mm.), plaited, reflexed, pale purple, lobes very small, lanceolate; flowers proterandrous, stamens and styles eventually slightly exserted and otherwise as in allied species; squamae pale green, flat, broadly cuneate, emarginate at apex, about 1 mm. long.

Laingsburg, Marloth no. 1520 (vii. '02). Flowered in Grahamstown Feb. 1903.

This species comes close to *C. hemiphaerica* which, however, has not the circular section of leaves and has larger corolla-lobes which are not decidedly reflexed.

## A list of South African species of *Crassula* described or renamed during recent years.

Compiled by Dr. S. SCHÖNLAND, Hon. M.A. Oxon.

(Those not represented in the Herb. of the Albany Museum are marked by an asterisk).[1]

### I. EUCRASSULA.

#### 1. LATIFOLIAE.

*Cr. nitida*, Schönl. (Records of the Alb. Mus. I, p. 54).

[1] For convenience sake, the species have, as far as possible, been arranged under the sections of the genus as defined in the *Flora Capensis*, Vol. II., although I am of opinion these cannot in several cases be kept up in the form adopted by Harvey. The genera *Helophytum* and *Bulliarda* have been sunk in *Crassula* under sect. *Tillaea*.

2. GLAUCINAE.

*Cr. pallida*, Bak. (Gard. Chronicle 1874, I. p. 786).

* *Cr. heterotricha*, Schinz. (Beitr. sur Kenntniss der afrik. Flora [Neue Folge] II. p. 203).

Both these species must, I think, be referred to *Cr. perfoliata*, var. *albiflora*, D.C. (Pl. Grasses t. 13). The differences pointed out by Baker hold good for some specimens, but they are scarcely noticeable in Bolus no. 612, which Baker quotes as type-specimens for his *Cr. pallida*.

3. PERFILATAE.

*Cr. monticola*, N. E. Br. (in Gard. Chron. XVIII, 1882, p. 264). It was described from Somerset East, but is fairly common in subcarroid places of the Midlands and Eastern District and extends to the Hex River in the West.

*Cr. rhomboidea*, N.E. Br. ( ) Matjesfontein, Dr. P. MacOwan, F.L.S.

4. SUBULARES.

*Cr. pallens*, Schönl. et. Bak. fil. (Journ. of Bot., Oct. 1898, p. 361). Karreebergen, R. Schlechter, no. 8310.

*Cr. MacOwaniana*, Schönl. et Bak. fil. (Journ. of Bot., Oct., 1898, p. 361)). Namaqualand, W. Scully, no. 191, and G. Alston.

*Cr. rudis*, Schönl. et Bak. fil. (Journ. of Bot., Aug. 1902, p. 283). Namaqualand, E. G. Alston.

*Cr. griquaensis*, Schönl. (Bull. de l'herb. Boissier, tome 5, p. 860). Kokstad, Natal Gov. Herb. no. 5182.

*Cr. dependens*, Bolus (Journ. Linn. Soc., Bot., Vol. xviii, p. 391). Cave mt, Graaffreinet, Bolus, no. 658 and Queenstown, E. E. Galpin, no. 2141.

*Cr. tenuifolia*, Schönl. (Bull. de l'herb. Boissier, tome 5, p. 860). Ipolweni, J. M. Wood, nos. 4462 and 1840. Clydesdale, Griqualand East, Tyson no. 2141.

*Cr. parvisepala*, Schönl. (Journ. Linn. Soc., Bot., xxxi, 1897, p. 549). Barberton, E. E. Galpin no. 979 ; Lydenburg, J. H. McLea, in Herb. Bolus no. 3025,

*Cr. punctulata*, Schönl. and Bak. fil. (Journ. of Bot., Oct. 1898, p. 362). At the mouth of the Klyn-river, R. Schlechter, no. 10403.

*Cr. Harveyi*, Britten et Bak. fil. (Journ. of Bot., 1897, p. 479). This name was given by Messrs. Britten and Baker to the plant quoted by Harvey as *Cr. alpestris* (Thunb ?). Thunbergs plant belongs to the subgenus *Pyramidella*,

*Cr. laxa*, Schönl. (Journ. Linn. Soc., Bot., xxxi, 1897, p. 549). Widely distributed in the Eastern parts of Cape, Colony.

*Cr. Galpinii*, Schönl. (Journ. Linn. Soc., Bot., xxxi, 1897, p. 548). Summit of Andriesberg, near Queenstown, E. E. Galpin, no. 2000. This species may be provisionally placed with the sect. Subulares. It will probably form a section by itself when the time comes to re-monograph the genus.

5. MARGINALES.

*Cr. swaziensis*, Schönl, (Journ. Linn. Soc., Bot., xxxi, 1897, p. 548). Havelock concession, Swaziland, E. Saltmarsh, no. 992.

* *Cr. acinaciformis*, Schinz (Beitr. zur. Kenntniss der afrikan. Flora, Neue Folge, II, 1894, p. 204)=*Cr. aloides*, N.E. Br. (Kew Bulletin, 1896, p. 161). Houtbosch, Rehmann, no. 6375.; near Barberton, E. E. Galpin.

*Cr. Southi*, Schönl. (Journ. Linn. Soc., Bot., xxxi, 1897, p. 550). Lower Albany, B. South; Evelyn Valley near Kingwilliamstown, T. R. Sim, no. 1271. This species seems to be identical with the following of which I have not seen any material.

† *Cr. mucronata*, Keissl. (Plantae Pentherianae, Pars 1, p. 38, fig. 5 in Ann. K. K. Hof Museum 1900). Alicedale, near Grahamstown, Penther no. 2333.

*Cr. drakensbergensis*, Schönl. (Bull. de l'herb. Boissier, tome 5, p. 861). Van Reenen, R. Schlechter, no. 6962.

*Cr. natalensis*, Schönl. (Bull. de l'herb. Boissier, tome 5, p. 861). Greytown, Natal, J. M. Wood, nos. 4637, 4337 and 4484.

*Cr. Flanagani*, Schönl. et Bak. fil. (Journ. of Bot., Oct. 1898, p. 362). East London, H. G. Flanagan, no. 1272, and Galpin, no. 3160.

*Cr. rubescens*, Schönl. et Bak. fil. (Journ. of Bot., Oct., 1898, p. 363). Mont aux Sources, Basutoland, H. G. Flanagan, no. 1834.

6. SQUAMULOSAE.

* *Cr. recurva*, N. E. Br. (Gard. Chron. ser. III, vol. VIII, p. 654). Zululand, Wood.

*Cr. argyrophylla*, Diels (Journ. of Bot., Aug. 1902, p. 290). Johannesburg, D. F. Gilfillan in Herb. Galpin, no. 6211; Lydenburg district, F. Wilms, no. 527. This and the following species are doubtfully referred to *sect.* Squamulosae.

*Cr. pachystemon*, Schönl. et Bak. fil. (Journ. of Bot., Oct. 1898, p. 367). Graaff Reinet, H. Bolus, no. 437, and G. Rattray, no. 13; Windvogelberg, near Cathcart, T. R. Sim; Mount Hope Farm, Upper Zwart Kei, E. E. Galpin, no. 2645.

*Cr. Ernesti*, Schönl. et Bak. fil. (Journ. of Bot., Aug. 1902 p. 283). Queenstown, E. E. Galpin, no. 2563.

*Cr. Rudolfi*, Schönl. et Bak. fil. (Journ. of Bot., Oct., 1898, p. 363). Brakdamm, Western Region, R. Schlechter, no. 1118.

*Cr. Bolusii*, Hook. fil. (Bot. Mag., Nov. 75, t. 6194). Cave-mountain, Graaff Reinet, and Oudeberg, Bolus, no. 423. Recently found by Mr. T. R. Sim on mountains near Cradock.

* *Cr. impressa*, N. E. Br. (Gard. Chron. 1879, II, p. 328). South Africa? (without locality).

*Cr. Cooperi*, Regel (Gartenflora, 1874, vol. 23, p. 36, t. 786)= *Cr. MacOwani*, Sond. Ms.—On mountains from Graaff Reinet to Natal. I do not quote any numbers of this species, as it passes gradually into the following one, which can scarcely be regarded as anything but a variety of *Cr. Cooperi* with scabrid leaves.—*Cr. montana*, Thunb. should be compared with this species (see Britten and Baker fil. in Journ. of Bot., 1897, p. 481).

*Cr. curta*, N. E. Br. (Kew Bulletin, 1895, p. 144)= *Cr. Schlechteri*, Schönl. (Journ. Linn. Soc., Bot. XXXI, p. 551). Natal.

* *Cr sedifolia*. N. E Br. (Gard. Chron., Dec. 13th, 1902). Sent to Kew from South Africa by Dr. P. MacOwan, F.L.S.

The last 5 species form with *Cr. lanuginosa* a natural group. This is the only reason why they have for the present been placed into sect. *Spuamulosae* which, moreover. can scarcely be separated from sect. *Marginales.*

7. PETIOLARES.

*Cr. cyclophylla*, Schönl. et Bak. fil. (Journ. of Bot., Oct. '98, p. 363). Perie bush near Kingwilliamstown, Schönland no. 847.

*Cr latispathulata*, Schönl. et Bak. fil. (Journ. of Bot., Oct. '98, p. 364). Izingolweni, Natal, J. M. Wood, no. 3054.

*Cr. multicava*, Lem. (Revue Horticole, 1862, p. 97)=*Cr. quadrifida*, Bak. (Saunders' Refug. Bot. t. 398).

In shaded places, woods between Grahamstown and Blaauwkrantz, Nov., 1500′, MacOwan, no. 1911 ; Port Alfred, July, 0-50′, Schönland, no. 746 ; East London, June 20-50′, Galpin, no. 1864 ; in woods near Keimouth, July, 100′, and rocky shady places near Komgha, Oct., 2000′, Flanagan, no. 161 ; Umhloti rocks, June, 1600′, Wood, no. 597 ; Inanda, June, Wood, no. 597b.

This species has normally tetramerous flowers, Wood 597b has, however, pentamerous flowers. It is naturalised in many Grahamstown gardens, in the immediate surroundings of which it does not occur wild, and flowers there from July to November. Even more so than *Cr. cordata* it forms broodbuds in the floral region by means of which it rapidly spreads under favourable circumstances.

8. THYRSOIDEAE.

*Cr. compacta*, Schönl. (Journ. Linn. Soc., Bot., xxxi, 1897, p. 550). Barberton, E. E. Galpin, no. 1092. This species was originally placed by me under sect. *Marginales*.

*Cr. albanensis*, Schönl. (Rec. of the Alb. Mus. i, p. 55), Grahamstown, Miss M. Daly and Miss M. Sole, no. 335, Schönland, no. 616.

*Cr. nodulosa*, Schönl. (Rec. of the Alb. Mus. i, p. 56). Warrenton, Miss C. Adams, no. 28.

9. ROSULARES.

*Cr. quadrangularis*, Schönl. (Rec. of the Alb. Mus. i, p. 57). Laingsburg, Dr. R. Marloth, no. 2512.

10. IMBRICATAE.

*Cr. mesembrianthoides*, Schönl. et Bak. fil. (Journ. of Bot., Aug., 1902, p. 284). Namaqualand, G. Alston.

*Cr. cornuta*, Schönl. et Bak. fil. (Journ. of Bot., Aug. 1902, p. 285). Namaqualand, E. G. Alston.

*Cr. decepta*, Schönl. et Bak. fil. (Journ. of Bot., Aug. 1902, p. 285), Namaqualand, E. G. Alston.

*Cr. elegans*, Schönl. et Bak. fil. (Journ. of Bot., Aug. 1902, p. 286), Namaqualand, E G. Alston.

12. GLOMERATAE.

*Cr. minutiflora*, Schönl., et Bak. fil. (Journ. of Bot., Aug. 1902, p. 288). Namaqualand, R. Schlechter, no. 11496.

*Cr. tenuipedicellata*, Schönl. et Bak. fil. (Journ. of Bot., Aug. 1902, p. 288) Arakup (Western Region), R. Schlechter, no. 11247.

*Cr. hirsuta*, Schönl. et Bak. fil. (Journ. of Bot., Oct. 1898, p. 365). Mess Klip (Western Region), R. Schlechter, no. 11283.

*Cr. oblanceolata*, Schönl. et Bak. fil. (Journ. of Bot., Oct. 1898, p. 365). Karreebergen, R. Schlechter, no. 8306.

* *Cr. tenuis*, Wolley Dod (Journ. of Bot., 1901, p. 392). Cape Peninsula, Wolley Dod, no. 3369, Wilms. no. 3252.

12A TILLAEA.

*Cr. Leipoldtii*, Schönl. et Bak. fil. (Journ. of Bot., Aug. 1902, p. 288). Clanwilliam, Leipoldt, no. 392.

*Cr. nana*, Schönl. et Bak. fil. (Journ. of Bot., Oct. 1898, p. 372). Zuurfontein (Western Region), R. Schlechter, no. 8560.

*Cr. Lambertiana*, Schönl. et Bak. fil. (Journ. of Bot., Oct. 1898, p. 371). Lambert's Bay, R. Schlechter, no. 8559.

*Cr. imbricata*, Schönl. (Rec. of the Albany Museum vol. I., p. 58). Andriesberg, E. E. Galpin, no. 1922.

*Cr. papillosa*, Schönl. et Bak. fil. (Journ. of Bot., Oct. 1898, p. 371). Matroosberg, Dr. R. Marloth, no. 1999.

*Cr. Dodii*, Schönl. et Bak. fil. (Journ. of Bot., Oct. 1898, p. 372). Vanrhynsdorp, R. Schlechter, no. 10994.

*Cr. aphylla*, Schönl. et Bak. fil. (Journ. of Bot., Oct. 1898, p. 371). Brontjesriver (Western Region), R. Schlechter no. 8664.

13. FILIPEDES.

*Cr. Simiana*, Schönl. (Journ. Linn Soc., XXXI, 1897, p. 552) = *Cr. dasyphylla*, Harv. = *Cr. corallina*, Thunb.

*Cr. maritima*, Schönl. (Bull de l'herb. Boissier, tome 5, 1897, p. 862)=*Cr expansa*, Ait. The plant which I formerly took to be *Cr. expansa* is *Cr. filicaulis*, E. Z., which is perfectly distinct though Harvey has united the two.

*Cr. tenuicaulis*, Schönl. (Bull. de l'herb. Boissier, tome 5, 1897, p. 864). Van Reenen, R. Schlechter, no. 6964.

*C. involucrata*, Schönl. (Bull. de l'herb. Boissier, tome 5, 1897, p. 863). Insiswa Mt., R. Schlechter, no. 6448.

*Cr. elongata*, Schönl. (Journ. Linn. Soc., Bot. xxxi, 1897, p. 552). Queenstown, E. E. Galpin, no. 2021.

*Cr. Woodii*, Schönl. (Bull. de l'herb. Boissier, tome 5, 1897, p. 863). Kareekloof, J. M. Wood, no. 4485.

*Cr. Tysoni*, Schönl. (Journ. of Bot., Aug. 1902, p. 289). Kokstad, W. Tyson, no. 1342.

*Cr. profusa*, Hook. f. (Bot. Mag., t. 6044 )=*Cr. marginalis*, (Soland.) in Ait. Hort. Kew., fide Ind. Kew.

14. CRENATO-LOBATAE.

*Cr. Marlothii*, Schönl. (Journ. Linn. Soc., Bot. xxxi, 1897, p. 553). Matroosberg, Dr. R. Marloth, no. 2202. This species is closely allied to *Cr. dentata*, Thunb., and not to sect. *Tillaea* as I was originally inclined to think.

*Cr. confusa*, Schönl. et Bak. fil. (Journ. of Bot., Oct. 1898, p. 366). Koudeberg, R. Schlechter no. 8727. Live specimens from Laingsburg, recently gathered by Dr. R. Marloth, show that the stem, leaves, bracts, and calyx are minutely papillose. The upper leaves are usually crenate.

15. TUBEROSAE.

*Cr. Promontorii*, Schönl. et Bak. fil. (Journ. of Bot., Oct. 1898, p. 366). Table Mountain, Capt. Wolley Dod, no. 1624.

*Cr. loriformis*, Schönl. et Bak. fil. (Journ. of Bot, Aug. 1902, p. 289). Kloof over Hex River Station, Capt. Wolley Dod.

*Cr. capensis*, Baill. (Hist. Pl. III, p. 312) =*Cr. Septas*, Thunb. fide Ind. Kew.

II. PRYAMIDELLA.

*Cr. Massoni*, Britt. et Bak. fil. (Journ of Bot., Dec. 1897, p. 485).=*Cr variabilis*, N. E. Br. (Kew. Bull., 1901,

p. 122) fide Bak. fil. I cannot find any tangible difference between this species and *Cr. alpestris*, Thunb. Three specimens of the latter collected at Brontjes river by R. Schlechter, (no. 8663) in the Herb. of the Albany Museum, have respectively capitate, corymbose and thyrsoid inflorescences. I am further of opinion that Zeyher no 660, which is represented in Herb Albany Museum, and which Harvey described as *Cr. multiceps* (Flora Capensis II, p. 359), should also be referred to *Cr. alpestris*, Thunb (non Harv.). Zeyher's plants were probably starvelings. Harvey overlooked that the leaves are ciliate, especially towards the base.

*Cr. pachyphylla*, Schönl. (Rec. of the Albany Museum I., p. 58). Matjesfontein, Dr. MacOwan; Laingsburg, Dr. R. Marloth, no. 2154.

III. SPHAERITIS.

*Cr. hispida*, Schönl. et Bak. fil. (Journ. of Bot., Oct. 1898, p. 368). Montagu, Bolus, no. 6704.

*Cr. multiflora*, Schönl. et Bak fil. (Journ. of Bot., Oct. 1898, p. 368) Montagu, Bolus no. 6702.

~~*Cr. remota*, Schönl. (Rec. of the Albany Museum I, p. ——), Nauuwpoort, T. R. Sim, no. 4.~~

*Cr. leucantha*, Schönl. et Bak. fil. (Journ. of Bot., Oct. 1898, p. 369). Howhoek, R. Schlechter, no. 7378.

*Cr. scalaris*, Schönl. et Bak. fil. (Journ of Bot., Oct. 1898 p. 369). Bullhoek (Western Region), R. Schlechter no. 8382.

*Cr. namaquensis*, Schönl. et Bak. fil. (Journ. of Bot., Oct. 1898, p 367) Namaqualand, G. Alston and R. Schlechter, no. 11210.

*Cr. decipiens*, N. E. Br. (Gard. Chron, Jan. 1903) = *Cr. namaquensis*, Schönl et Bak fil.

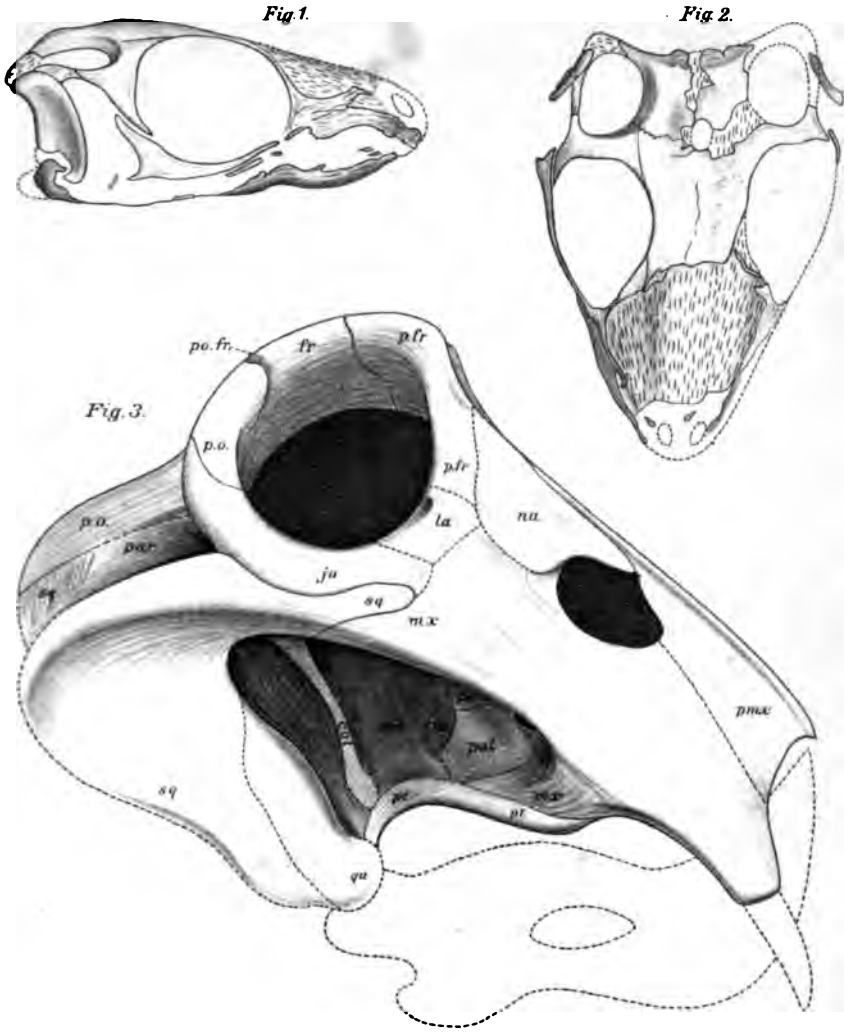
*Cr anomala*, Schönl. et. Bak. fil. (Journ. of Bot., Oct. 1898, p. 370). Frenchhoek, R. Schlechter, no. 9317.

VI.—GLOBULEA.

*Cr. Rattrayi*, Schönl. et Bak. fil. (Journ. of Bot., Aug. 1902, p. 290). Graaffreinet, G. Rattray, no. 30.

*Cr. subacaulis.* Schönl. et Bak. fil. (Journ. of Bot, Oct. 1898, p. 370). Steinkopp (Western Region), R. Schlechter, no. 11498.

*Cr. torquata*, Bak. (Saunders' Refugium Botanicum, iii, t. 154). A specimen from Komgha, H. G. Flanagan, no. 835, in the Herb. of the Albany Museum must be referred to this species which comes very close to *Cr. obvallata, L.*




R.B del.

Lith. Anst. Julius Klinkhardt, Leipzig

*Fig. 1. and 2.* *Skull of Paliguana Whitei, Broom.*

*Fig. 3.* *Skull of Lystrosaurus M^c Caigi, Seeley.*

*Fig. 4, 5 and 6.* *Portions, of Manus, Pelvis, and Pes of* Procolophon trigoniceps, Owen.

Fig. 1.

Fig. 2.

Fig. 4.

Fig. 3.

Fig. 8.

Fig. 7.

Fig. 6.

Fig. 5.

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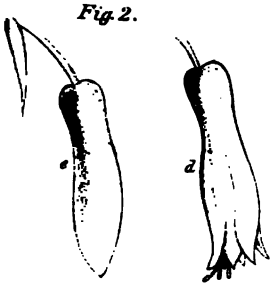
Hottentot and Bushman pottery.

*Fig. 2.*



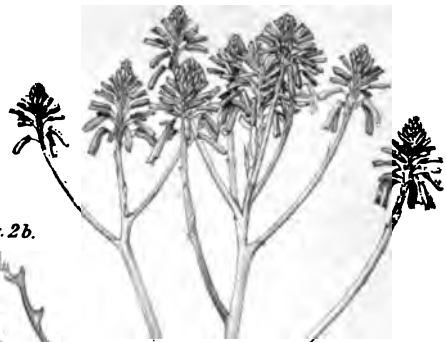



*Fig. 2b.*

*Fig. 2c.* *Fig. 3a.*

*Fig. 2a.*

*Fig. 1.*

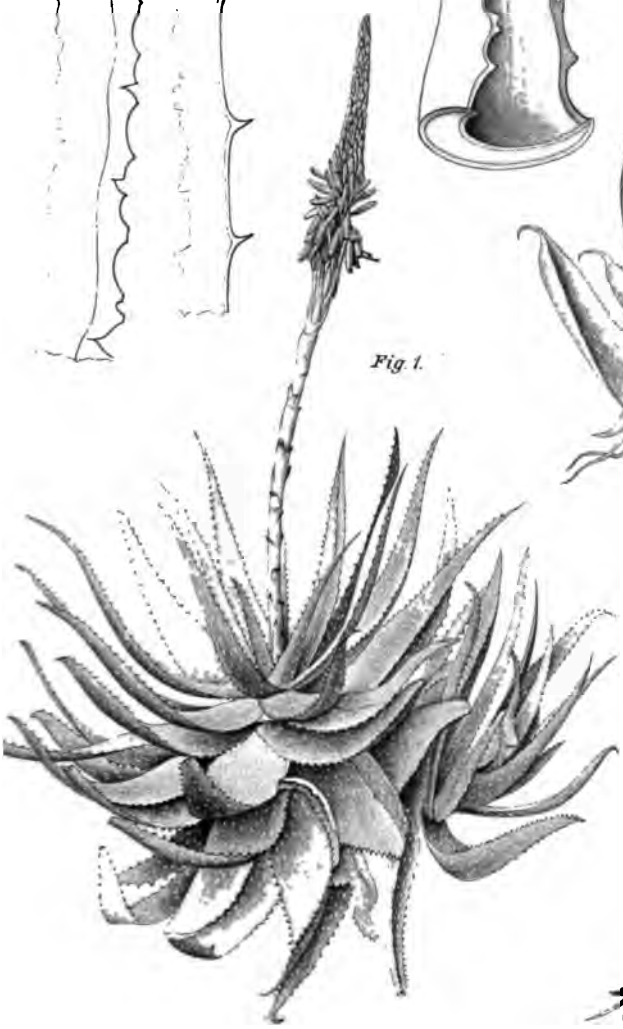
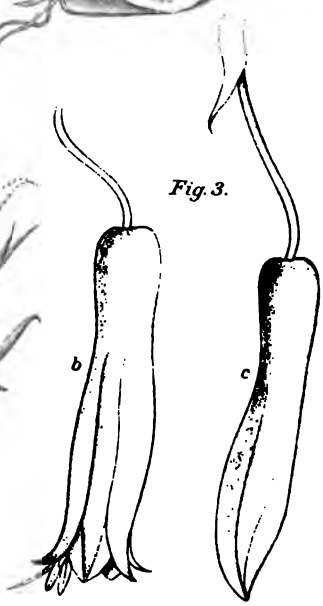


*Fig. 3.*

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*South African Aloes.*

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# Records of the . .

# Albany Museum.

## VOL. I.

**PART II CONTAINING:**

On two new Eothiodont genera. By Prof. R. Broom.

On a new species of Oudenodon. By Prof. R. Broom.

On some points in the anatomy of the Anamodont skull. By Prof. R. Broom.

On the Theriodonts in the Albany Museum. By Prof. R. Broom.

Notes on the manus of Procolophon. By Prof. R. Broom.

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Some South African Grasses in the Herbarium of the Albany Museum. By Prof. E. Hackel.

Some new and some little known species of South African Plants.—II. By Dr. S. Schönland.

**PLATES IV and V.**

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All communications with reference to them should be addressed to

Dr. S. SCHÖNLAND,
Director of the Albany Museum,
Grahamstown,
South Africa.

On two new Endothiodont genera (*Prodicynodon* and *Opisthoctenodon*).—By R. Broom, M.D., B. Sc., C.M.Z.S., Victoria College, Stellenbosch.

In 1876 Owen described a portion of the skull and mandible of a large reptile resembling in many respects some of the larger species of *Oudenodon* but differing in having a number of teeth on the palate and the mandible. To the new form Owen gave the name of *Endothiodon bathystoma*, and regarded it as forming the type of a distinct family of the *Anomodontia*—the "*Endothiodontia*." A few years later (1879) he described a new species *Endothiodon uniseries*, differing from the first described species among other things in having but a single row of teeth instead of two or three rows as in the other. Seeley in 1895 described a new form under the name of *Cryptocynodon simus*, somewhat resembling *Endothiodon uniseries* but having small canine teeth. As early as 1868 Huxley had described another allied form as *Pristerodon McKayi*, but its true affinities were only first recognised by Seeley in 1895, who rightly places it among the Endothiodonts. Seeley has also suggested that *Endothiodon uniseries* ought to be made the type of a new genus *Esoterodon*, and with this I thoroughly agree.

These four genera are the only Endothiodont genera that have as yet been described; and while it is generally recognised that they form a distinct group by themselves, there is some difference of opinion as to where this group should be placed. Owen believed that *Endothiodon* is closely related to *Oudenodon*, and Lydekker is also of the opinion that the *Endothiodontidæ* should be placed in

the same suborder as the *Dicynodontidæ*. Seeley on the other hand would place the Endothiodonts with the Theriodonts rather than with the Dicynodonts.

Within the last two years I have been fortunate in discovering the greater part of a skull of a large Endothiodont—probably *Endothiodon bathystoma*, two fairly complete skulls belonging to two species of a new genus, and a small skull of a second genus. With one of the small skulls I found the greater part of the anterior half of the skeleton. This additional evidence proves that the Endothiodonts are exceedingly closely allied to the Dicynodonts. In fact, it is doubtful if there is any character in the skull apart from the presence of small teeth on the maxillaries and dentaries by which they can be distinguished from the true Dicynodonts.

PRODICYNODON PEARSTONENSIS, gen. nov. et. sp. nov.

The type of this new genus and species is unfortunately in a very imperfect condition. It is the anterior half of a small skull broken across through the orbits and very badly weathered. On hasty examination it would appear to be the skull of a small *Dicynodon*, and such I considered it to be for some months after I found it. It was only on examining it minutely with a view to determining the species that I discovered behind the large canine a number of small pointed teeth both in the upper and lower jaws. Had the specimen not been badly weathered these teeth would not have been seen, and the specimen would undoubtedly have been referred to as a species of *Dicynodon*, with which it agrees in other respects most closely.

Owing to the very weathered condition of the skull, it is impossible to give a very satisfactory description of the bones. The premaxillary is more developed than is usual in *Dicynodon*, and is relatively broader and flatter. It extends on the upper surface of the skull backwards between the nasals and the prefrontals, and articulates with the frontals.

The nasals are comparatively small, and are widely separated from each other by the premaxillaries.

Immediately behind the nasal is the prefrontal, a bone about the same size as the nasal.

The frontals are long and narrow, but are considerably broader

in front than behind. The interorbital region is much narrower than is usual in Anomodont skulls.

Each of the maxillaries is considerably weathered. On the right side there is the remains of a moderate sized tusk which is directed forwards and slightly downwards. Behind the tusk the maxillary shows a greater relative development than in *Dicynodon* and on the left side of the skull it is seen that this posterior part of the bone bears a number of small simple molars. At least five teeth can be detected, and these are arranged in two rows. There is no indication of any serrations on the teeth.

The palatines and pterygoids so far as preserved agree closely with those bones in *Dicynodon*.

Of the lower jaw only the front half is preserved. It is in front deeper than in *Dicynodon* and much less compressed laterally. The dentary has a very well developed ridge above the lateral vacuity. The splenial is well developed and extends backwards apparently as far as the dentary.

**Fig 3 and fig. 4, Plate IV., show side view and upper view of the front of the skull of *Prodicynodon pearstonensis*; very slightly enlarged.**

## OPISTHOCTENODON AGILIS, gen. nov. et sp. nov.

The specimen which is made the type of this new genus and species was found at Pearston, not far from the spot where the type of *Prodicynodon* was found. It consists of a fairly complete but crushed skull, with the following other recognisable remains: —left clavicle, interclavicle, sternum, left humerus, radius and ulna of both sides, fairly complete right carpus with a number of phalanges and some carpal and phalangeal bones of the other manus. A fairly complete pelvis with the greater part of both hind limbs was found close to the front part of the skeleton, but it is possible that the pelvis does not belong to the same individual.

The skull, as will be seen from the figure (fig. 1, pl. IV) is strikingly like that of a small *Oudenodon*, but the presence of a series of teeth in the maxillary and dentary bones at once distinguishes it from the better known Anomodont. The front of the beak differs from that in *Oudenodon*, in that it terminates in a small, sharp, downwardly directed point. The frontal and prefrontal regions are similar to those in *Oudenodon*, but the parietal region is relatively very much broader, being nearly twice as

broad as the interorbital region. The parietal region may be divided into three parts separated by two longitudinal ridges—a median part formed by the parietals and preparietal, and pierced by a large parietal foramen, and two lateral portions formed by the postorbitals ("postfrontals"). The occiput slopes forwards. The squamosals are large bones, very similar to those in *Oudenodon*. The maxillaries resemble considerably the maxillaries in *Oudenodon*, but have a series of teeth in the posterior part. In the type specimen the maxillary teeth are not shown, but in a specimen of the same genus in the South African Museum the maxillary teeth are well shown. The lower jaw is very much broader and flatter than in any other Anomodont with which I am acquainted. In each dentary is a series of teeth, there being apparently five mature teeth with evidences of succeeding teeth on the inner sides of some of them. In structure they agree closely with the teeth of *Pristerodon mackayi*—the front being smooth and the posterior edge forming a series of denticulations. The molar teeth agree so closely with those of *Pristerodon*, that it might readily be thought that the present species is a species of *Pristerodon*. The type of *Pristerodon* described by Huxley is in a very imperfect condition, and if only the type were known, I should have referred the Pearston specimen to *Pristerodon*. In the South African Museum there is a more perfect specimen of *Pristerodon* collected many years ago by Mr. Mackay at East London, and apparently from the same locality as the type. In the Capetown specimen there is a well-developed canine which at once distinguishes *Pristerodon* from the form under consideration. In the London specimen, Dr. Smith Woodward informs me that he is unable to find any trace of a canine; but as the anterior part of the skull is very badly preserved in the type specimen, it is possible that the canine is lost. On the present evidence I think it better to conclude that *Pristerodon* had a well-developed canine, and that the Pearston specimen represents an allied genus in which the canine is wanting.

Among the Anomodonts we have quite a number of pairs of genera, tusked and tuskless, and it is just possible as has been suggested that the tusked are the males and the tuskless the females. Thus we have *Dicynodon* and *Oudenodon*, *Cryptocynodon* and *Esoterodon*, *Pristerodon* and *Opisthoctenodon*, and some specimens of *Cistecephalus* with tusks and others apparently without. A very strong argument against this view is found in the fact that *Lystrosaurus* is always tusked. Though dozens of

specimens have been found, no tuskless forms have yet been discovered. Another argument against the view is that in the Upper Karroo beds, though *Dicynodon* is common, *Oudenodon* has not yet been discovered, so far as I am aware.

A description of the bones of the postcranial skeleton will be published elsewhere in connection with a large series of other Endothiodont remains. Here it may be well to state that the clavicle is long and very mammal-like, the inter-clavicle a small flat oval bone, and the sternum an irregular flat rounded bone about twice the size of the interclavicle. The humerus, radius and ulna are of the regular Anomodont type, but much more feebly developed than in *Oudenodon*. The carpus agrees fairly well with that of *Oudenodon*, but appears to have a prepollex. The phalanges are long and slender and the fifth digit appears to be absent.

**Fig 1, plate IV, shows upper view of the skull.**

On a new Species of *Oudenodon (O. trigoniceps)*.—By R. BROOM, M.D., B. Sc., C.M.Z.S., Victoria College, Stellenbosch.

In 1901 I communicated to the Zoological Society of London a paper on the structure and affinities of *Oudenodon*, in which was described the almost perfect skeleton of a small form. Owing to the extremely weathered condition of the upper surface of the skull, it was impossible to decide with certainty to what species it belonged, and I referred it doubtfully to *O. gracilis*. The only part of the skull in the small skeleton sufficiently well preserved to be of service in determining the species, is the lower jaw, and as unfortunately the lower jaw of *O. gracilis* is unknown, it has been impossible till recently to definitely settle the question. Within the last year, however, I have discovered two well-preserved small *Oudenodon* skulls, both with the lower-jaws in position; and while there is no doubt that both the new skulls belong to the same species as the small skeleton, they are both quite distinct from *Oudenodon gracilis*. As the new form also differs from the other previously described species, I propose to call it ***Oudenodon trigoniceps***. The better preserved of the two skulls which I

take as the type, is probably the most perfect specimen of a reptilian skull that has been found in S. Africa. It is slightly distorted, the back somewhat crushed, and the lower jaw slightly displaced, but otherwise every bone may be said to be almost perfect.

The principal characteristics of the skull are the following :— The parietal region is comparatively flat, and as broad as the frontal : the occiput slopes forwards : and the dentary bone forms a very prominent ridge above the fenestra of the jaw. The orbits look upwards and slightly outwards, and the frontal region is slightly convex from before backwards, but moderately flat from side to side.

The larger of the two skulls, though less perfect than the one chosen as the type, shows the snout in an uncrushed and almost perfect condition. The premaxillary bone is of fair size, and its median process passes backwards some distance between the nasals, but does not reach the frontals. The nasals are much longer than narrow, and on each at its outer side and a little behind the nostril is a prominent bony ridge.

The sutures between the maxillaries, lachrymals, prefrontals and nasals are not distinct in either of the specimens. On the maxillary bone there is a fairly well marked bony ridge passing downwards and forwards to strengthen the caniniform bony process. Posteriorly the maxillary forms part of the suborbital arch, overlapping the jugal and almost reaching to the anterior part of the squamosal.

The frontals are large, moderately flat bones. The suture with the prefrontal is not distinct, but each frontal seems to form about half of the upper border of the orbit. There is a slight supraorbital ridge, and a less distinct median ridge formed by the two frontals. Between the frontals posteriorly there passes the narrow but fairly long preparietal.

The postorbital arch is formed mainly by the postorbital bone, which is supported behind by the upward process of the jugal. The jugal is of large size, but in front it is largely hidden by the maxillary and behind by the squamosal. The postorbital besides forming the postorbital arch, forms almost the whole of the inner border of the temporal fossa, the long posterior process lying alongside the parietal and meeting the inner part of the squamosal. The parietals are of fair size.

The squamosal is as in Anomodonts generally of very large size. The anterior part extends forward to the level of the posterior angle of the orbit. The zygomatic portion is flattened, and lies in a plane which is directed outwards and slightly upwards. The lower portion of the squamosal is directed almost directly outwards. It gives support to a well-developed quadrate.

The occiput is considerably crushed, and the sutures are not distinct.

The lower jaw is well preserved, and shows beautifully the peculiar development of the angular, which gives the jaw as marked an inflected angle, as is seen in Marsupials. A prominent ridge runs along the dentary above the vacuity. Between the angular and a ridge on the upper border of the surangular there is a deep concavity such as has been figured by Seeley in *Endothiodon*.

An upper view of the skull of natural size is given in figure 2, plate IV.

On some points in the anatomy of the Anomodont skull.—By R. BROOM, M.D., B.Sc., C.M.Z.S., Victoria College, Stellenbosch.

## I.—On the Cranio-facial Axis.

The first endeavour to explain the structure of the cranio-facial axis in any Anomodont was that by Huxley (1) in 1859. In that year he described a skull of a new type of Dicynodont reptile to which he gave the name *Dicynodon murrayi* (=*Lystrosaurus murrayi*), and was able by means of this specimen and by a less perfect specimen which he had sectioned, to throw some light on the internal structure of the skull. Unfortunately Huxley completely misunderstood the nature of the bones with which he was dealing, so that his account of the structure of the cranio-facial axis is quite misleading. What he considers to be the presphenoid is really the vomer; while the structure which he describes at considerable length as the "ethmovomerine plate or nasal septum" is entirely a part of the premaxillary bone. It is therefore

unnecessary to criticise at length his views as to the "bird-like" and lacertilian characters which he observes in the palate.

Seeley (²) in 1889 gave a somewhat lengthy account of the structure of the Dicynodont skull, but added little to our knowledge of the deeper structures.

In 1900 I (³) gave an account of the Dicynodont palate, and for the first time showed the real structure of the vomer, and its relation to the premaxillary and sphenoid.

As the result of the examination of specimens in the Albany Museum, I am now able to give a complete account of the bones of the basi-cranial axis, and of their relations to each other.

Fig. 5, plate IV represents a median section of a skull of *Lystrosaurus latirostris*. The parts mapped by a continuous line are drawn from a single specimen: the parts marked by dotted lines are restored from two other specimens.

If the figure be compared with fig. 2 in my previous paper, it will be seen that the premaxillary and vomer are very similar in each, though the specimens belong to different species. Behind the vomer lies the basisphenoid. In my earlier paper I stated that possibly the anterior part of this bone might be the presphenoid, though I was unable to detect any suture between it and the part which is undoubtedly basisphenoid. In no specimen have I been able to find any trace of a suture, so that it is probably advisable to regard the whole bone from the vomer to the basi-occipital as the basi-sphenoid. In front, this bone is a thin osseous plate and is clasped by the vomer along the whole of its anterior border. Above, it articulates with the ethmoid. It gradually widens as it passes backwards to articulate with the basi-occipital. On its under side it gives an articulation to the pterygoids.

The ethmoid bone which lies between the upper end of the basi-sphenoid and the frontal is a comparatively thin plate. The anterior border projects considerably into the nasal region, while the posterior border is hollowed out above to accommodate the anterior part of the brain probably, and below is notched probably for the optic nerves. Between the ethmoid and the nasal and premaxillary bones there was in all probability a large nasal septal cartilage.

The frontal bone on median section is seen to be unusually thick at the part where it is supported by the ethmoid. Immediately behind it, is seen the little preparietal bone. Between this latter and the parietal is situated the large parietal or pineal foramen.

Whether the element behind the parietal is to be regarded as the inter-parietal or supra-occipital it is at present difficult to decide.

It will be observed that in general structure the cranio-facial axis of the Anomodont bears a much greater resemblance to that of the mammal than to that of either the tortoises, the lizards or the birds.

## II.—The Relations of the Jugal.

Though in all the Anomodonts the jugal may be said to articulate with the maxilla in front and the squamosal behind, and to form the lower border of the orbit, it differs in its relations in different members of the group so greatly that some account of the conditions seems advisable.

In *Oudenodon trigoniceps* the jugal forms almost the whole of the suborbital arch. On its outer and under side it is overlapped by the posterior part of the maxilla, which reaches to a point a little beyond the level of the middle of the orbit. At the posterior and inferior angle of the orbit the post-orbital (post-frontal) meets the jugal so that the latter forms practically no part of the posterior border of the orbit. The jugal, however, sends up a strong process along the posterior and inner side of the post-orbital and thus forms the greater part of the lower half of the post-orbital arch. Immediately below the point of articulation of the lower end of the post-orbital lies the anterior end of the zygomatic process of the squamosal on the outer side of the jugal, but not articulating with the post-orbital. The posterior or zygomatic portion of the jugal passes along below the squamosal and forms the lower border of the anterior two-thirds of the zygomatic arch. It forms the inner surface of most of the anterior half of the arch, but only a very small part of the upper border.

In *Oudenodon truncatus* the anterior part of the zygomatic process of the squamosal is much better developed, and the posterior part of the jugal less developed, so that the jugal forms only about a third of the lower border of the zygomatic arch. Otherwise the relations of the bones are precisely similar to those found in *O. trigoniceps*.

In *Oudenodon gracilis* the suborbital arch is not very well shown in the type; but it appears that the maxillary does not

overlap the jugal quite so much as in the other species. The squamosal, on the other hand, certainly passes further forward, and the jugal only forms about a quarter of the lower border of the zygomatic arch. The specimen does not show satisfactorily how much of the postorbital arch is formed by the jugal.

In *Opisthoctenodon* the relations of the jugal and the squamosal are almost exactly similar to those in *Oudenodon trigoniceps*; the only difference being that the jugal has here a less developed ascending postorbital process.

In *Dicynodon latifrons* the jugal differs in its relations very considerably from that in *Oudenodon*. When the skull is viewed from the side, only two small parts of the jugal can be seen, the one in the lower and anterior angle of the orbit, the other in the lower and posterior angle. Elsewhere it is completely hidden by the maxillary, the squamosal and the postorbital bones. The squamosal passes forward almost to a level with the front of the orbit, and has a large articulation with the postorbital above and with the maxillary below. The jugal is probably not very much smaller than in *Oudenodon truncatus*. It forms most of the inner side of the suborbital arch and sends a process up behind the post orbital bone. It also forms the inner wall of the anterior part of the zygomatic arch. The posterior part of the maxillary is of large size, and forms almost the whole of the lower border of the suborbital arch. In the restoration given by Seeley (*) of the side view of the skull of *Dicynodon* the maxillary is shown as forming a part of the zygomatic arch. In *D. latifrons* it does not reach back quite as far as the posterior margin of the orbit.

In a small *Dicynodon* skull about 3½ inches in length, and probably belonging to a new species, the relations of the bones are practically similar to those seen in the smaller *Oudenodons*. The anterior part of the squamosal, however, is here more strongly developed.

In *Lystrosaurus* the jugal is largely hidden by the maxillary and the squamosal, almost exactly as in *Dicynodon latifrons*. It forms the whole of the lower border of the orbit, sends up a small delicate process behind the postorbital, and has a larger posterior process below and behind the squamosal. The anterior part of the squamosal is well developed and extends forward almost to the level of the front of the orbit, and articulates with the maxillary.

It will be seen that in all the above types the structure of the jugal varies very little, and that the different appearances pre-

sented in the suborbital regions are due to the different degrees of development of the squamosal and maxillary bones.

## III.—The Preparietal.

In all skulls of *Lystrosaurus* that are at all well preserved there is seen immediately in front of the parietal foramen a moderate sized median bone. It articulates with the paired frontals in front, and fits in between the paired parietals behind. It was apparently first noticed by Huxley, and in the British Museum Catalogue, 1890, it is referred to by Lydekker as a "Wormian bone." By Seeley it is referred to as the "Preparietal" bone. It was probably the absence of a median suture where this bone is situated that misled Owen into the idea that the parietal is single. The relations of the bone are best seen in Seeley's (*) figure of the upper side of the skull of *Mochlorhinus platyceps* (=*Lystrosaurus platyceps*). Whether it is a wormian bone or an element of deeper significance it is at present difficult to decide. I am not aware that it has hitherto been found in any genera but *Lystrosaurus* and *Gordonia*, but recently I have discovered that it is present in practically all the Anomodont genera. In *Oudenodon trigoniceps* it is quite distinct and of fair size. It extends from the parietal foramen as far forward as the level of the posterior border of the orbits, and it is about half as broad as one of the frontals. Though it is thus a much narrower bone than in *Lystrosaurus*, it is relatively about as large, and it has exactly similar relations to the frontals, parietals and parietal foramen. On looking for it in other Anomodonts I found that a very small but distinct preparietal occurs in *Oudenodon gracilis*. Here it might almost be described as rudimentary. In *Oudenodon truncatus* the preparietal is also distinct, and though relatively small it is by no means rudimentary. In the Endothiodont genus *Opisthoctenodon* there is also a fairly well developed preparietal lying in front of the parietal foramen exactly as in *Lystrosaurus*. In *Dicynodon*, owing to the post-orbital bones usually forming more or less distinct crests, and rendering it difficult to satisfactorily remove the matrix from this region I have been unable to clearly demonstrate the presence of a preparietal. In one small skull, however, in which only the cast of the bones of the parietal region remains, the appearances strongly indicate the presence of a distinct preparietal. In *Gordonia* there is a median element lying mainly in front of the parietal foramen, and which doubtless corresponds

to the preparietal of the S. African forms. By Newton ([5]) it is regarded as the interparietal.

It would thus appear that the preparietal occurs in the majority of the Anomodont genera. It is unknown in the Theriodonts, the Therocephalians or the Pareiasaurians, and would thus appear to be a new element that has arisen in the Anomodont. Though in all probability it has originated as a wormian bone, its occurrence in a number of very dissimilar genera, and its occasional large development seem to entitle it to a distinctive name.

## IV.—The Mandible.

Though a good many descriptions have been given of the bones of the mandible, there are still a few points that are obscure. As the result of the examination of specimens in the Albany Museum, I can now, however, give pretty full details of the structure of the mandible in *Lystrosaurus*; while specimens in my own collection reveal fully the structure of all the elements in the lower jaw of *Oudenodon*.

In *Lystrosaurus* the mandible is composed of the usual five elements,—dentary, angular, surangular, splenial and articular. The dentaries of the two sides are firmly anchylosed, as in the tortoise, and form approximately the anterior halves of the jaws. The splenials, if not anchylosed, are closely united to each other, and form the lower part of the front of the beak; and they add considerably to the strength of the beak by forming a sort of axis round which the dentaries are formed. The surangular is a moderate-sized element which forms the upper part of the posterior half of the jaw. In front it articulates with the dentary above the large vacuity of the jaw, the surangular lying to the inside of the dentary. Posteriorly it forms a large articulation with the articular, the surangular passing between the articular on the inside and the angular on the outside. The large vacuity of the jaw separates the anterior part of the surangular from the angular. The angular is a fairly large element of a most irregular shape. It sends a long slender process forward below the vacuity to articulate with the dentary and the splenial. This anterior process passes inside of the dentary and between the dentary and the splenial. On passing backwards the angular forms a deep fan-like expansion of which the lower part forms a well-developed process which passes downwards, backwards and slightly inwards. The upper part of the fan like posterior part rests on the articular and

on the surangular. The articular is a much larger element than I was formerly inclined to believe. Besides forming the whole of the large articulation, it forms a considerable part of the inner side of the posterior third of the jaw. When the jaw is viewed from the outer side the greater part of the articular is hidden by the surangular and angular: and the surangular not only hides part of the anterior portion, but by passing backwards and outwards against the articular portion almost completely hides this latter as well.

In *Oudenodon* the structure of the lower jaw is essentially similar to that in *Lystrosaurus*. The dentary is rather large and forms more than half of the jaw. The angular is a large element which is composed of an anterior process passing forward between the dentary and the splenial, and a posterior greatly expanded portion. This latter sends downwards and inwards a moderate sized plate below the general line of the lower border of the jaw, and which recalls the inflected angle of the lower jaw of some Marsupials. The upper border of the angular passes considerably outwards from the general surface, and a deep fossa lies between this ridge of the angular and an outerward passing ridge formed by the surangular. This fossa apparently corresponds to that described by Seeley (6) in the jaw of Endothiodon. The surangular and articular agree fairly closely with those bones in *Lystrosaurus*. The splenials are distinct. They add greatly to the symphysis, but do not press far backwards.

The lower jaw in the small Endothiodonts seems to be very similar to that in *Oudenodon*.

### References to Literature.

(1) T. H. Huxley, "On some Amphibian and Reptilian Remains from South Africa and Australia," Quart. Journ. Geol. Soc., vol. xv., 1859.

(2) H. G. Seeley, "On the Anomodont Reptilia and their Allies." Phil. Trans., 1889, B.

(3) R. Broom, "On the Structure of the Palate in Dicynodon and its Allies." Tr. S. Af. Phil. Soc., 1900.

(4) H. G. Seeley, "On the skull of Mochlorhinus platyceps, &c." Ann and Mag. Nat. Hist. (7), vol. 1, 1898, p. 164.

(5) E. T. Newton. "Some New Reptiles from the Elgin Sandstones." Phil. Trans., vol. 184B (1893), p 431.

(6) H. G. Seeley, "Further Evidence of Endothiodon bathystoma (Owen), &c." Quart. Journ. Geol. Soc., vol. xlviii, p. 476.

REFERENCE TO FIGURE.

Fig. 5 Plate IV represents a median section of a skull of Lystrosaurus latirostris, slightly reduced.

B.O., Basioccipital; B.S., Basisphenoid; E.O., Exoccipital; Eth., Ethmoid; F.M., Foramen magnum; Fr., Frontal; I.P., Interparietal; Na., Nasal; Pa, Parietal; P.F., Pineal foramen; Prex., Premaxillary; P.P., Preparietal; Pt, Pterygoid; Vo., Vomer.

## On the Theriodonts in the Albany Museum. By R. BROOM, M.D., &c.

### CYNOGNATHUS PLATYCEPS, Seeley.

Specimen No. 1.—This is the almost perfect skull which forms the type. The snout is broken off a little behind the canine teeth, and the back part of the skull is slightly crushed, but otherwise the skull may be said to be perfect. The specimen is described at considerable length by Seeley (Phil. Trans. Vol. 186 B. 1895, p. 132), and three illustrations are given. Though one or two of Seeley's determinations are very doubtful, the description is on the whole accurate. The illustrations, however, are very unsatisfactory, and though the outlines are fairly correct, little or no attempt is made to show the sutures which are mostly distinctly shown on the specimen. The few sutures which are shown on the figures are for the most part incorrectly placed. In figure 29 the squamosal bone is shown as forming part of the posterior wall of the orbit; in fig. 28 the sutures of this region are shown in an entirely different arrangement. It is those in figure 28 that are fairly correct; those of fig. 29 being entirely wrong, the most anterior part of the squamosal being 12 mm. behind the orbit. In figure 30 there is no attempt made to indicate the different bones of the palatal region.

The specimen is of very great value for the light it throws on the structure of the palate and the articular regions of the Theriodont skull.

The pterygoids are well developed, forming a large part of the concave hollow behind the posterior nares, and also forming apparently the whole of the very large downwardly directed pterygoid processes. I am unable to find any trace of the trans-

verse palatine bones referred to by Seeley. Transpalatine or ectopterygoid bones are well developed in the Theriocephalians, and in most primitive reptiles, but I have not been able to find any trace of them in any Anomodont or Theriodont. Owing to crushing it is difficult to determine with certainty the structure of the posterior pterygoid region and the sphenoidal region.

The small elongated bone which lies between the basi-occipital and the quadrate is of great interest. It articulates by its inner end with the basi-occipital and possibly also with the basi-sphenoid; and by its outer end with the squamosal and apparently also with the exoccipital and the quadrate. The little bone seems to be hollowed out in the centre. Whatever be the determination of the bone it is evidently homologous with the little hour-glass like bone which occupies a similar situation in the Anomodonts. This bone was originally believed by Seeley to be the "malleus," but in his paper dealing with Cynognathus he expresses the opinion that it is a "rudimentary straight cochlea." As the bone is solid in the Anomodonts it cannot be a cochlea in these forms. Though some doubt still exists I am inclined to the opinion I have previously given that the bone is a tympanic.

The squamosal has a short downward process almost on a line with the little supposed tympanic, and along the front of this lies the small quadrate,—apparently a small roller-like bone with a convex articulation for the lower jaw. It has, however, an upward process which fits into a groove on the back of the squamosal. The articular has a transverse articulation apparently of similar length to that of the quadrate. The angular is well shown passing backwards into a hollow in the dentary. The bone which lies on the inside of the dentary in front of the pterygoid process I believe to be the surangular. I cannot be certain of a distinct splenial.

Pres. by Dr. R. KANNEMEYER, Wonderboom, Burghersdorp.

Specimen No. 2.—This is the snout which Seeley has made the type of (?) Cynognathus leptorhinus, and described and figured (Phil. Trans. Vol. 186, B. 1895, p. 140). The circular hole in the upper nasal region which Seeley is inclined to regard as a normal depression for the lodgment of a gland seems to me to be entirely due to crushing. The bones that are seen at the bottom of the depression are doubtless the upper parts of the nasals displaced. The suture between the two bones does not lie directly antero-posteriously, but has been rotated about 30 degrees out of the

middle line, thus proving that the part has been broken from its original position. All those portions of the snout which can be compared with similar parts in the type of Cynognathus platyceps agree so closely as to leave no doubt that not only does the snout belong to Cynognathus, but to C. platyceps. The snout, however belongs to a scarcely mature animal, hence the presence of the two canines. The posterior of the two is the old one, and the anterior the replacing. To the outer side of the 3rd incisor there is the remains of the deciduous 3rd incisor.

The antero-posterior measurement of the four molars in front of the last in spec. 2 is 31mm. In the type they measure 31.7 mm.

Pres. by Dr. R. KANNEMEYER, near Burghersdorp.

CYNOGNATHUS sp.

Specimen 3.—This is the very badly crushed and imperfect anterior part of the skull with lower jaws of a species of Cynognathus Though the upper part of the snout is lost, almost the whole of the dentition is preserved. The specimen resembles considerably C. crateronotus, but is only about two-thirds the size. The anterior of the molars resemble those of C. Berryi, but the posterior molars are very much larger. In Seeley's description of the type of C. Berryi the measurements of the teeth are not given with sufficient minuteness to enable one to make a satisfactory comparison, and considering how inaccurate the figures of C. platyceps are, it is difficult to know how far one can rely on the figure of C. Berryi. If the 8th and 9th teeth are correctly described as small, then the present specimen must belong to a new species. I think it advisable, however, not to name it till a comparison with the type of C. Berryi is possible. The following are the principal upper tooth measurements :—

| | Height. | Length. |
|---|---|---|
| Canine | probably about 25 mm. | 10.5 mm. |
| 1st molar | 5 mm. | 3.5 mm. |
| 2nd molar | 5.5 mm. | 4 mm. |
| 3rd molar | —— | —— |
| 4th molar | 7 mm. | —— |
| 5th molar | 8.5 mm. | 8 mm. |
| 6th molar | 9.5 mm. | 9.2 mm. |
| 7th molar | probably about 10.5 mm. | 10.2 mm. |
| 8th molar | „ „ „ | 11 mm. |
| 9th molar | „ „ 11 mm. | about 11 mm. |

There are 3 cusps on the back of the 7th and 8th molars.

Pres. by Dr. KANNEMEYER, Wonderboom, Burghersdorp.

Specimen 4.—This is a small fragment of the skull of a Cynognathus, not improbably belonging to the same individual as the above jaws. It shows the posterior part of the right jugal and squamosal bones and the articular region of the right mandible.

Portions of the dentary, angular, probably surangular, and the greater part of the articular are well preserved. The specimen shows the posterior arch of the jaw in almost perfect preservation.

Pres. by DR. R. KANNEMEYER, Wonderboom, Burghersdorp.

GOMPHOGNATHUS KANNEMEYERI, Seeley.

Specimen 5.—This is the type specimen of Gomphognathus Kannemeyeri described and figured by Seeley (Phil. Trans. vol. 186 B., 1895, p. 4). It consists of the back half of the skull, broken off through the orbits, the entire mandibles, and the upper four cervical vertebræ. The figure which Seeley gives of the side view is inaccurate and misleading, owing, among other things to the fact that the whole of the angular bone has been apparently inadvertently omitted from the drawing.

The lower jaw, besides the almost perfect dentary, shows the greater part of the articular, the whole of the outer side of the angular, and the greater part of the flat bone which lies on the inner side of the dentary near the point of union of the anterior part of the coronoid process with the ramus, and which I believe to be the surangular, but which is regarded by Seeley as the "coronoid." The splenial is not displayed.

The occiput is well displayed, and has been figured by me (Proc. Zool. Soc., 1903, vol. 1). The sutures unfortunately cannot be made out with certainty. The specimen also shows the squamosals, jugals, and postorbitals (postfrontals) very satisfactorily, and in a less satisfactory condition the parietals and part of the frontals. The sphenoidal and articular regions are fairly well displayed.

The specimen shows most beautifully the structure of the upper four cervical vertebrae including the proatlas. These have

been figured and described by me (Proc. Zool. Soc., 1903, vol. 1)

Pres. by Dr. R. KANNEMEYER. Near Burghersdorp.

Specimen 6. Consists of a series of 10 dorso-lumbar vertebrae of the same individual as the skull (spec. 5). The ribs resemble very closely those of Cynognathus crateronotus, but have the broad flattened ribs relatively shorter. The vertebrae are probably the 10 immediately in front of the sacrum.

Pres. by Prof. H. G. SEELEY, F.R.S. Near Burghersdorp.

TRIRACHODON KANNEMEYERI, Seeley.

Specimen 7. This is the type specimen of Trirachodon Kannemeyeri described and figured by Seeley (Phil. Trans., vol. 186B, 1895). It is an almost perfect skull with the jaws in position, and with the remains of the atlas and axis vertebrae. All the sutures on the external surface of the skull are very distinct, but the occiput is much crushed and imperfectly displayed. Both dentaries are almost perfect, and on the inner side of the right is seen a part of the delicate splenial. Both articulars and angulars are also well shown. The quadrates are very small and supported by downward processes of the squamosal. From the inner corner of this downward process there passes inwards a very delicate bony bar. This is manifestly the homologue of the bone in Cynognathus, which I believe to be the tympanic.

The axis, atlas, and proatlas I have figured and described elsewhere (Proc. Zool. Soc. 1903, vol. 1).

Pres. by Dr. R. KANNEMEYER. Near Burghersdorp.

Specimen 8. The greater part of a skull with the lower jaws attached. The snout has been broken off in front of the canines, and the back part broken off through the parietal and sphenoidal regions. Though this specimen differs very greatly from the type I have no hesitation in referring if to the same species—the differences being due to the fact that the type is immature and crushed, and this specimen mature and uncrushed.

The frontal region is practically flat, as is also the posterior nasal region. A small but distinct parietal foramen is found about 10 mm. behind the plane of the postorbital arch.

The following are some of the principal measurements:—

| | |
|---|---|
| Between the orbits ... ... | 24 mm. |
| Width of snout behind canines ... | 22 mm. |
| Length from back of canine to back of last molar... ... ... | 38 mm. |
| Length of last 5 molars ... ... | 18·5 mm. |

Pres. by Dr. R. KANNEMEYER. Wonderboom, Burghersdorp.

Specimen 9. The imperfect middle portion of a skull, apparently of the type species. The skull has been broken across a little behind the canines, and posteriorly through the middle of the orbit. A portion of each mandible with a few imperfect teeth is preserved.

Pres. by Dr. R. KANNENEYER. Wonderboom, Burghersdorp.

Specimen 10. A badly weathered skull of the same species. The specimen has had the snout broken off behind the canines, and the mandibles have been almost completely weathered away, but the posterior part is fairly complete, though largely undeveloped and with the temporal arches weathered away. The specimen is of value in showing the structure of the jugal, which is characterised by having a well-marked downward process. This process is much less developed than in Gomphognathus, but relatively more developed than in Cynognathus. It also throws some light on the quadrate region.

Pres. by Dr. R. KANNEMEYER. Wonderboom, Burghersdorp.

Note on the Manus of Procolophon.—By R. BROOM, M.D., &c.

In part 1, vol. 1, of the Records of the Albany Museum, page 19, I stated that "there are four phalanges in the 5th digit." This is incorrect. A specimen of apparently a new species of Procolophon has recently been acquired by the South African Museum, and on being developed was found to present the almost perfect left manus. The true digital formula was then seen to be 2, 3, 4, 5, 3, as in all other known Diapsosaurians. A re-examination of the Albany Museum specimen also shows that the phalanx which I believed to be the penultimate is really the terminal.

Prof. H. F. Osborn, in his recent paper on the Diapsosauria (Mem. Am. Mus. Nat. Hist., 1903), suggests that the carpal element which I regarded as the radiale is really a centrale. The carpus certainly has the appearance of having lost the radiale: but in none of the three carpi which I have examined have I been able to find a radiale in addition to the element which lies between the 1st carpale and the element which is undoubtedly a centrale. If I am wrong in regarding this element as the radiale, then it would seem that the radiale has been cartilaginous.

The genus *Albuca* in the Herbarium of the Albany Museum, Grahamstown (with descriptions of 14 new species) by J. G. BAKER, F.R.S., late Keeper of the Herbarium, Royal Gardens, Kew.

Subgenus *Eualbuca.*

*A. altissima*, Dryand. Oatlands Park, Grahamstown, alt. c. 1900', Miss M. Daly et Miss M. Sole, No. 317, Oct. 1902.

(In the specimen collected by Miss Daly and Miss Sole, the bulbs are in pairs, each about 1 inch in diameter, the tunics are split into bristles above, the peduncle is about 1 foot long, the raceme a few inches long, the lowest pedicel is less than 1 inch long, none of the pedicels is cernuous at the tip, the bracts are ovate-lanceolate, the outer stamens have small anthers which are polliniferous, the style is longer than the ovary.—S. Schönland.)

*A. minor*, L. C. B. Spei, regio occidentalis, Kleenkobbis, in collibus, alt. 800', R. Schlechter, No. 10,989, Aug. 1897; Vogelklipp in collibus, alt. 2,600', R. Schlechter, No. 11,307, Sept. 1897; in arenosis ad cataractam Tulbaghensem, alt. 500', R. Schlechter, No. 1,397, Sept. 1892.—Grahamstown, B. South, Nov. 1893; Miss M. Daly et Miss M. Sole, No 353a, Oct. 1902.—Port Alfred, alt. c. 80', S. Schönland, No. 1,544, Sept. 1902.

*A. minor*, L.? C. B. Spei, regio occidentalis, Kleenkobbis, in collibus, alt. 800', R. Schlechter, No. 10,991 ?, Aug., 1897.

(In this specimen the outer tunics are split into fibres, and the lower portion of the leaves is coarsely corrugate.—S. Sch.)

*A. Cooperi*, Baker. Port Elizabeth, J. L. Drège, No. 72, Aug. 1903.

*A. trichophylla*, Baker. Grahamstown, Miss M. Daly et Miss M. Sole, No. 353, Oct. 1902.

*A. bifolia*, Baker n. sp. Bulbus globosus, 1 poll. diam., tunicis albis membranaceis. Folia 2 lanceolata suberecta plana glabra 3–4

poll. longa 4-5 lin. lata. Pedunculus gracilis 4-5 poll. longus, racemus biflorus, pedicellis brevibus, ascendentibus, bracteis ovatis. Perianthium campanulatum 6-9 lin. longum, segmentis oblongis obtusis sordide luteis late viridi carinatis. Stamina fertilia 3, stylus brevis prismaticus.

Grahamstown, alt. 2,000 pedes, Miss M. Daly et Miss M. Sole, No. 306, Oct. 1902.

*A. Dalyae*, Baker, n. sp. Bulbus ovoideus ½ poll. diam., setis copiosis elongatis brunneis coronatus. Folia 2-3 erecta glabra anguste linearia firmula 6-8 poll. longa ¾ lin. lata. Pedunculus gracilis semipedalis. Racemus laxus pauciflorus, pedicellis erecto-patentibus, inferioribus 15-18 lin. longis, bracteis ovatis cuspidatis. Perianthium campanulatum 6-8 lin. longum, segmentis oblongis obtusis albis late viridi-vittatis. Antherae aeternae minutae. Stylus prismaticus ovario aequilongus.

Grahamstown, alt. 2,000 pedes, Miss M. Daly et Miss M. Sole, Nos. 333, 503, Oct. 1902.

*A. Schoenlandi*, Baker, n. sp. Bulbus globosus 18-20 lin. diam., tunicis brunneis membranaceis. Folia 5 suberecta plana glabra margine ciliata, exteriora oblonga obtusa 2 poll. longa 7-8 lin. lata, interiora acuminata 4-5 poll. longa deorsum 8-9 lin. lata. Pedunculus 2 poll. longus. Racemus corymbosus multiflorus 5-6 poll. longus, pedicellis erecto-patentibus, inferioribus 2-3 poll. longis, bracteis ovato-lanceolatis parvis membranaceis. Perianthium 6 lin. longum, segmentis lineari-oblongis obtusis albis brunneo carinatis. Stamina fertilia 3. Stylus brevis prismaticus.

Grahamstown, alt. 2,000 pedes, Miss M. Daly et Miss M. Sole, No. 347, Oct. 1902.

*A. semipedalis*, Baker, n. sp. Bulbus ovoideus 1 poll. diam., tunicis membranaceis pallidis. Folia 3 anguste linearia suberecta glabra 2-3 poll. longa 1 lin. lata. Pedunculus gracilis glaber 3-4 pollinaris. Racemus densus brevis 6-8-florus, pedicellis erecto-patentibus inferioribus 6-9 lin. longis, bracteis ovatis. Perianthium 6 lin. longum, segmentis lineari-oblongis albis late brunneo vittatis. Stamina fertilia 3. Stylus prismaticus, ovario aequilongus.

C. B. Spei, regio occidentalis: Kleenkobbis, in collibus, alt. 800 pedes, R. Schlechter, No. 10,985, Aug. 1897.

*A. acuminata*, Baker, n. sp. Bulbus globosus 6-9 lin. diam., tunicis albis membranaceis. Folia 4-5 teretia erecta glabra 4-5

poll. longa deorsum 1 lin. diam. Pedunculus gracilis 4–5 poll. longus. Racemus laxus pauciflorus, pedicellis tortuosis inferioribus 9–14 lin. longis, bracteis magnis ovatis acuminatis. Perianthium 6 lin. longum, segmentis acuminatis sordide luteis late brunneo carinatis. Stamina fertilia 3. Stylus brevis prismaticus.

C. B. Spei, regio occidentalis: Vogelklipp, in collibus, alt. 2,600 pedes, R. Schlechter, No. 11,308, Sept. 1897.

Subgenus *Falconera*.

*A. fastigiata*, Dryand. Grahamstown, alt. c. 2,000′, Miss M. Daly et Miss M. Sole, No. 318, Oct. 1902.

*A. caudata*, Jacq. Grahamstown, alt. c. 2,000′, Miss M. Daly et Miss M. Sole, Nos. 247, 316, 490 (Sept., Oct. 1902); Dr. H. Becker, Oct. 1900; S. Schönland, No. 558, Oct. 1898.

*A. pachychlamys*, Baker. Warrenton, alt. 3,900′, Miss C. Adams, No. 86, Sept. 1902; Mt. slopes, Upper Moodies, Barberton, alt. 4,500′, E. E. Galpin, No. 630, Sept. 1889; Lower hill slopes, Queenstown, alt. 3,500′, E. E. Galpin, No. 1592, Oct. 1893.

*A. humilis*, Baker. C. B. Spei, regio occidentalis: Olifant river, R. Schlechter, No. 5,022, Aug. 1894.

*A. tortuosa*, Baker. Brakkloof, near Grahamstown, Mrs. G. White, Sept. 1897; Grahamstown, Miss M. Daly et Miss M. Sole, No. 346, Oct. 1902.

*A. setosa*, Jacq. Grahamstown, Miss M. Daly et Miss M. Sole, No. 334, Oct., 1902.

(In this specimen the margins of the leaves are minutely ciliate, the cilia are white, the bracts are about an inch long, green with white membranous edges.—S. Sch.)

*A. spiralis*, L.f. C. B. Spei, regio occidentalis: Olifant River, alt. 500′, R. Schlechter, No. 4,994, Aug. 1894; Brakdam, in collibus, alt. 2,000′, R. Schlechter, No. 11,137, Sept. 1897; Clanwilliam, alt. 350′, R. Schlechter, No. 8,414, Aug. 1896.

*A. longifolia*, Baker, n. sp. Bulbus verosimiliter magnus. Folia 5–6 linearia glabra erecta basin pedunculi longe vaginantia 2–3 pedes longa, 3–4 lin. lata. Pedunculus validus 1½-2 pedalis. Racemus laxus 8–10 poll. longus multiflorus, pedicellis erecto-patentibus inferioribus 15–18 lin. longis, bracteis lanceolatis inferioribus 12–15 lin. longis. Perianthium oblongum 1 poll.

longum, segmentis lineari-oblongis albis (vel pallidissime luteis) late viridi-carinatis. Antherae fertiles 6, aeternae majores. Stylus brevis prismaticus.

Coldstream, prope Grahamstown, alt. 2,300 pedes, Miss M. Daly et Miss M. Sole, No. 269, Sept. 1902.

*A. circinata*, Baker, n. sp. Bulbus globosus, tunicis albis membranaceis. Folia plura erecta glabra subteretia 6–9 poll. longa 1 lin. diam. apice circinata. Pedunculus validus glaber semipedalis. Racemus subdensus pauciflorus, pedicellis erecto-patentibus inferioribus 6–9 lin. longis, bracteis ovatis cuspidatis magnis. Perianthium campanulatum 6–8 lin. longum, segmentis oblongis sordide luteis late viridi vittatis. Stamina omnia antherifera. Stylus prismaticus ovario aequilongus.

C. B. Spei, Port Alfred, Hon. Mr. Justice Jones, Aug. 1893; S. Schönland, No. 1545, Sept. 1902.

*A. brevipes*, Baker, n. sp. Bulbus globosus 8–9 lin. diam., tunicis albis membranaceis. Folia 2 erecta glabra anguste linearia 6–8 poll. longa 1½ lin. lata. Pedunculus gracilis 4 poll. longus. Racemus pauciflorus, pedicellis brevissimis patulis vel ascendentibus, bracteis ovatis parvis. Perianthium 4½ lin. longum, segmentis lineari-oblongis albis brunneo-carinatis. Antherae omnes fertiles aequales. Stylus brevis clavatus.

C. B. Spei, regio occidentalis: Goechas (Little Namaqualand), in collibus, alt. 3,000 pedes, R. Schlechter, No. 11,363, Sept. 1897.

*A. zebrina*, Baker, n. sp. Bulbus angustus, tunicis exterioribus supra collum productis membranaceis albis vittis perspicuis transversalibus brunneis decoratis. Folia (imperfecta) angustissima subteretia rigidula glabra. Pedunculus gracilis strictus 3–4 poll. longus. Racemus 5–6 florus, pedicellis inferioribus brevissimis cernuis, bracteis linearibus 5–6 lin. longis. Perianthium 4 lin. longum, segmentis lineari-oblongis brunneo-carinatis. Antherae fertiles 6 subaequales. Stylus brevis primaticus.

C. B. Spei, regio occidentalis: Goechas, in collibus, alt 3,000 pedes, R. Schlechter, No. 11,371, Sep. 1897.

*A. Schlechteri*, Baker, n. sp. Bulbus globosus, 1½ poll. diam., tunicis albis membranaceis. Folia 7–8 erecta pubescentia anguste linearia deorsum dilata vaginantia 9–8 poll. longa. Pedunculus glaber modice validus 8–9 poll. longus. Racemus laxus, semipedalis pedicellis ascendentibus inferioribus 15–18 lin. longis, bracteis

magnis ovato-lanceolatis. Perianthium campanulatum 6 lin. longum, segmentis oblongis obtusis sordide luteis late viridi vittatis. Antherae 6 fertiles magnae. Stylus prismaticus, ovario aequilongus.

C. B. Spei, regio occidentalis: Steinkopf, in collibus, alt. 2,900 pedes, R. Schlechter, No. 11,497 (an 11,501 ?), Nov. 1897.

Subgenus *Leptostyla.*

*A. longipes*, Baker, n. sp. Bulbus globosus 9–10 lin. diam. tunicis albis membranaceis. Folia 2 linearia erecta glabra complicata semipedalia 1–1½ lin. lata. Pedunculus gracilis 3 poll. longus. Racemus 5-florus corymbosus, pedicellis erecto-patentibus 1½-2 poll. longis, bracteis parvis ovatis. Perianthium 7–8 lin. longum, segmentis oblanceolatis obtusis albis late brunneo-carinatis. Antherae omnes fertiles, aeternae duplo minores. Stylus filiformis 3-4 lin. longus.

C. B. Spei, regio occidentalis: Buffel River, in collibus, alt. 1,600 pedes, R. Schlechter, No. 11,259, Oct. 1897.

*A. micrantha*, Baker n. sp. Bulbus globosus 18 lin. diam.. tunicis multis brunneis membranaceis. Folia lanceolata glabra plana 3–4 poll. longa 5–6 lin. lata. Pedunculus modice validus 2 poll. longus. Racemus densus multiflorus 3–4 poll. longus, pedicellis adscendentibus, inferioribus 12–15 lin. longis, bracteis lanceolatis. Perianthium 4½–5 lin. longum, segmentis lineari-oblongis albis anguste brunneo-vittatis. Stamina omnia fertilia. Stylus filiformis.

C. B. Spei, regio occidentalis: Steinkopf, in collibus, alt. 2,800 pedes, R. Schlechter, No. 11,491, Oct. 1897.

*A. affinis*, Baker n. sp. Bulbus globosus, 9-12 lin. diam., tunicis membranaceis. Folio 3 lanceolata erecta brevia glabra 3 lin. lata. Pedunculus 1½–2 poll. longus. Racemus pauciflorus, pedicellis ascendentibus, inferioribus 15–18 lin. longis, bracteis erecto-lanceolatis. Perianthium 6 lin. longum, segmentis lineari-oblongis albis brunneo-viridi carinatis. Antherae omnes fertiles, 3 minores. Stylus subulatus 4 lin. longus.

C. B. Spei, regio occidentalis: Steinkopf, in collibus, alt. 2,800 pedes, R. Schlechter, No. 11,501, Nov. 1897.

Ad *A. micrantham*, Bak. arcte affinis an varietas ?

*A. concordiana*, Baker n. sp. Bulbus parvus globosus, tunicis membranaceis albis supra collum productis, Folia pauca linearia

glabra 2–3 poll. longa 1½–2 lin. lata. Racemus laxus 8–10-florus 3 poll. longus, pedicellis inferioribus erecto-patentibus vel cernuis 4–6 lin. longis, bracteis ovato-lanceolatis. Perianthium 6 lin. longum, segmentis oblongo-spathulatis albis brunneo-carinatis. Stamina omnia fertilia. Stylus subulatus 3–4 lin. longus.

C. B. Spei, regio occidentalis: Concordia, in collibus, alt. 3,100 pedes, R. Schlechter, No. 11,320, Sep. 1897.

## Biography of the late Mrs. F. W. BARBER, and a List of her Paintings in the Albany Museum.

By DR. S. SCHÖNLAND.

Mrs. F. W. Barber, née Mary Elizabeth Bowker, was the eighth child of Miles Bowker, one of the British settlers of 1820.(1) She was born about 1820, just before leaving England. She spent her youth at Tharfield near the Kleinemond River (about 8 miles east of Port Alfred), which was the location of the Bowkers. From early youth she displayed an innate love of natural history pursuits in all its branches. She followed her brothers everywhere on their hunting expeditions, collecting beetles, butterflies, plants, &c. Though cut off from the resources of civilisation and without the helpful encouragement of fellow-students, she developed her powers of observation, and accumulated many facts which in later life brought her the friendship of Charles Darwin, the Hookers, Dr. Harvey, and many other eminent men of science, and which secured to some of her scientific papers admission to the publications of the Linnean Society and other learned Societies. She was married in 1840 to Mr. F. W. Barber and had three children—Fred, Harry and Mary (Mrs. Bailie of Kimberley). All her early life was spent on lonely farms. Many times she had to leave her home and fly for safety from the Kafirs and frequently she was shut up in laagers surrounded by hostile savages.

In 1854 she went to live on the farm Lammermoor on the Zwart Kei near Queenstown, which was granted to her husband for services in war against the chief Kreli. About 1858 she moved to the farm Highlands near Grahamstown and during her long stay here her principal investigations were made.

In 1872 she accompanied her sons to the Diamondfields of Griqualand West, living for years in waggons and tents, all her

(1) For the data of Mrs. Barber's life I am indebted to her son, Mr F. H. Barber.

spare time being occupied in observations and in making collections.

In 1880 she took up her abode with her sons on a farm on the Fish River, which she left with them in 1886 for the Witwatersrandt goldfields.

In 1891 she visited Europe for the first time since childhood, travelled in England and on the continent, and returned to the Transvaal in 1892. She visited Natal and Cape Colony at various times during the remaining years of her life and died at Pietermaritzburg in the month of August, 1899.

During her life-time she presented to the Albany Museum her herbarium and her collection of butterflies, and it was therefore judged by her children best to present her paintings also to this institution, where they will find an honorable place amongst the exhibits and where they will be a means of instruction to many visitors and may even stimulate some to follow in her footsteps. To all who see these pictures it will be a surprise to learn that Mrs. Barber never had any instruction in drawing or painting, yet many of the samples of her brush which we now fortunately own, could scarcely be surpasssed by a good professional artist. Besides painting, Mrs. Barber was fond of music and of poetry. A volume of 50 of her poems "grave and gay, reflecting clearly the many mental powers and loving true-heartedness of the gifted authoress"(1) was published by her son, Mr. F. H. Barber, in 1898. It was dedicated to her brother, Colonel James Henry Bowker, F.L.S., F.Z.S., who shared her enthusiasm for the study of Natural History. It was entitled "The Erythrina tree and other verses."

In the first poem "The Erythrina Tree" one clearly discerns a longing for the home of her youth which is an ideal place for the naturalist.

"Bright, glorious Erythrina tree,
Remote from cities—near the sea,
My winged thoughts have flown to thee.
Queen of the woods, I love thee well;
Oh! for a home with thee to dwell
For ever in the forest dell."

Space forbids me giving further extracts from this or other poems, but to lovers of Nature the following other poems will specially appeal: "A flower of the Karroo," "The Lay of the Tadpoles," "The Lay of the Frog," "Malvern," and "The Dragon Flies."

(1) R. Trimen, F.R.S., in the preface to the volume.

Though Mrs. Barber only published comparatively few scientific papers, they are of lasting merit. I will briefly pass them in review as far as I have been able to trace them.(1)

"*Locusts and Locust Birds*" in Trans. S. Afr. Phil. Soc., Vol. I, p. 193-218 (Read Sep. 79).

A valuable and comprehensive paper bringing together all that was known at the time about the common S. African migratory locust, its enemies, &c. Much of the paper has now become common knowledge. It was based on observations by the authoress, her two sons and some of her friends. It has done much to assist subsequent observers who, however, with their fuller knowledge have not been able to accept all of Mrs. Barber's conclusions.

"*On the peculiar colours of animals in relation to habits of life.*" Trans. S. Afr. Phil. Soc., Vol. I, p. 27 (87)—45 (105) (Read June, 1878).

This paper owed its origin to a perusal of a paper by Mr. A. R. Wallace, "On the colours of animals and plants," and (in the words of the authoress) " it may perhaps be the means of throwing additional light on these matters." She successfully combats Mr. Wallace's theory of the production of colours in animals, and upholds Charles Darwin's theory of female selection in many instances. She then deals with the *indicative* or *banner colours* in polygamous birds, *protective colours* in some bright-coloured birds and in butterflies, and lastly she records interesting observations on the colours of Chameleons.

*A Plea for Insectivorous Birds.* Read before the Eastern Province Literary and Scientific Society, Grahamstown, July 1886. Published in pamphlet-form by Messrs. Richards, Slater & Co., Grahamstown, 1886.

In this paper the authoress enters a strong plea for the preservation and protection of insectivorous birds both for ethical and practical reasons She clearly points out how agriculturists and horticulturists will suffer in the future if her advice is not heeded.

*On the structure and fertilisation of Liparis Bowkeri.* Journ. Linn. Soc. (Botany) Vol. 10, p. 455-458 (with 7 figures in

(1) I am indebted to Dr. H. Becker, F.L.S., F.S.A , Mr. L. Peringuey, F.E.S., and Mr .F. H. Barber for assisting me to make the list as complete as possible and for the loan of some of the papers.

the text). Records observations on this orchid made on cultivated specimens at Highlands, shows that for the production of seeds crossfertilisation by insects is necessary.

*On the fertilisation and dissemination of Duvernoia adhatodoites.* Journ Linn. Soc. (Botany) Vol. 11, p. 469-472 (with 5 figures in the text). Shows that this plant is almost without exception fertilised by large carpenter-bees (*Xylocopa sp.)* and also describes the peculiar method by which the seeds are dispersed.

Two papers were read to the Linnean Society, but, it seems, were not printed: "*On the Stone-Grasshopper of Grahamstown, South Africa*" (Proc. Linn. Soc., Feb. 4th, 1869) and "*On Carnivorous and Insectivorous Plants*" (Proc. Linn. Soc., Dec. 1st., 1870). The observations in the former have, however, been referred to by Trimen and others.

Her best known paper is perhaps the following:

"*Notes on the peculiar habits and changes which take place in the larva of Papilio Nireus.*" Trans. Ent. Soc., 1874, p. 519-521 (with Plate IX).

Mrs. Barber was one of the first to discover the variable protective resemblance in the pupae of certain butterflies, and to discuss its probable causes. *Papilio Nireus* will, thanks to Mrs. Barber's paper, remain a classic example of this peculiar power of adaptation (See E. B Poulton 'The colours of animals," International Science Series, Vol. LXVIII, 1890, p. 115-118, 129).

In her correspondence with friends, some of whom have been mentioned before and which included some of the foremost men of her time, she must have simply been bubbling over with interesting facts discovered by her. Many of the works of these friends have numerous citations from her letters, *e.g.* Layard and Sharpe's "Birds of South Africa," Trimen's "South African Butterflies," Harvey's "Thesaurus Capensis." Many of her plants were mentioned in the "Flora Capensis" and other botanical publications and many of her discoveries of new species of insects and plants were named after her. The genus *Barberetta* was named by Harvey in her honour, and the genus *Bowkeria* was dedicated to her and her brother, Col. Bowker. I will let two of these friends speak for themselves to show the value of her contributions. R. Trimen, in the preface to his "South African Butterflies" (p. IX), says:

"To Mrs. F. W. Barber, the sister of Colonel Bowker, I am

also greatly indebted. Long known to European Botanists for her attainments and discoveries in regard to the Flora of the Cape, this lady had a wide acquaintance with South African Natural History generally, and in 1863 turned her attention specially to Lepidoptera. With characteristic generosity—knowing that I was bringing out a book on the subject—Mrs. Barber offered me the fullest aid, and constantly since then have her net, pen and artistic pencil been actively engaged in furtherance of my work. Of special value have proved her graphic accounts of the habits and stations of the butterflies of the Eastern Districts of Cape Colony, where she has chiefly resided and her coloured drawings of larvae and pupae, some of which are reproduced in Plates I and II of this volume."—

Harvey in the "Thesaurus Capensis" (Vol. I p. 24) in dedicating the genus *Bowkeria* to her and her brother states that she has contributed largely to our knowledge of the plants of the Eastern Province. In a footnote he adds the following. "In one of Mrs. Barber's recent letters she writes: 'I am one of your converts: it is to you that I owe the existence of my hobby, for I never should have known anything of botany had I not, by mere chance, seen a copy of your 'Genera of South African Plants,' with the introduction to Botany at the beginning of it. This volume I borrowed, and hence commenced some of the happiest days of my life: for in all places, and at all times, in peace and in war, botany has been one of my greatest pleasures; and often, when we have been driven away from our homes, and had them burned by savages, and have had nothing to shelter us but a waggon for months together, then botany has been my sovereign remedy to drive away care. And often my two little boys would say:—'Mamma, shall we ask papa to have the waggon inspanned to go to another place, for there are no more new wild flowers here? So you see, anything I can do to assist you, by collecting plants, is only repaying the debt of gratitude, I owe you for value received.'" "I trust," Harvey continues, "I violate no confidence in thus printing part of a lady's letter, which I do, because it happily illustrates the power of botany to afford interesting amusement and occupation when shut out from society and from ordinary pursuits. How many unemployed hours of a forced or voluntary bush life are tediously spent, which might be pleasantly and usefully filled up, if the mind were imbued with Natural History tastes! When the observing faculties have been once aroused and directed to natural

objects or phenomena, the taste for recording observations and collecting specimens quickly follows, and the late victim of ennui now 'all eye, all ear,' finds that time no longer lags, but runs only too quickly away. I am happy to say that I have made more than one S. African 'convert,' but if my little book had produced no other result than the pleasure it has afforded to my excellent correspondent, and the interesting specimens she has contributed for what she calls 'value received,' I should consider myself amply repaid."

May her collection of pictures, a lasting monument of her 'conversion' bring us many more such converts.

## Pictures of Historical Interest.

1. The COLESBERG KOPJE or New Rush, 1871.

This picture was painted a few months before Colesberg Kopje was recognised as being diamondiferous. It forms, as everybody knows, the site of Kimberley mine. The two figures near the top of the Kopje represent Messrs. F. H. and H. M. Barber, who were then boys travelling with their parents.

2. General view of KIMBERLEY in the "early days."
A town of tents.

3. Residence of Madame Favre.—NEW RUSH, DIAMONDFIELDS (KIMBERLEY).

4. A street in NEW RUSH, DIAMONDFIELDS (KIMBERLEY) where Mrs. Barber lived with her family in the early days.

5. St. Cyprian's Church, NEW RUSH, DIAMONDFIELDS (KIMBERLEY).

6. The grave of William Edward Boys, son of Major Boys, NEW RUSH, DIAMONDFIELDS (KIMBERLEY).

70 One of Mrs. Barber's encampments at DE BEERS (1871) showing amongst other things the cask in which the water had to be carried from a distance of three or four miles, the cart used for riding the ground off the mine and also for general purposes, sieves for sifting the ground, &c.

71. KIMBERLEY MINE when first rushed, showing "Gilfillan's Tree" (a Kameeldoorn, which is also shown on picture No. I). On the left is the camp, which afterwards became the main street of Kimberley.

## Pictures of Birds.

7. *Myrmecocichla bifasciata*, Seebohm.—(BUFF-STREAKED CHAT).
Male, female, nest and four eggs.

Extends from Eastern Cape Colony to the Transvaal.

8. *Turdus olivaceus*, Linn.—(CAPE THRUSH).
Male, female, nest and 2 eggs.

Found throughout South Africa south of the Orange River.

9. *Pachyprora capensis*, Shelley.—(CAPE FLYCATCHER).
Male, female, nest and 3 eggs.

Widely distributed in South Africa.

10. *Aegithalus capensis*.—(CAPPOC VOGEL).
Male, female and nest.

This bird is, except in forest districts, widely distributed in South Africa. The nest, formerly only made of the cottony down of plants, is now universally made of wool in parts where woolly sheep are kept. The entrance to it is through the spout at the top, the hollowed portion below is only a sham entrance. For further particulars see Stark, "Birds of South Africa," Vol. I., p. 311.

11. *Pyromelana capensis*, Sharpe.—(BLACK AND YELLOW BISHOP BIRD).
Male, female and nest.

Widely distributed in South Africa. In the Eastern parts the birds are somewhat smaller than in the West, and have been distinguished as a race under the name of *Pyromelana capensis minor*.

12. *Vidua principalis*, Cuv.—(PIN-TAILED WIDOW BIRD).
Male (in breeding plumage) and female.

Widely distributed in South Africa and throughout Tropical Africa.

13. *Upupa Africana*, Bechst.—(SOUTH AFRICAN HOOPOE).
Two females.

The South African Hoopoe is widely distributed from Cape Colony to the Zambesi.

14. *Coracias garrula*, Linn.—(EUROPEAN ROLLER).
Male and female (?)

This bird is widely distributed in Europe extending to Central Asia. It winters in Africa, where it frequentty reaches the shores of the Indian Ocean.

15. *Corythornis cyanostigma*.—(MALACHITE-CRESTED KINGFISHER).
Male and female.

This beautiful little Kingfisher is abundant throughout South Africa, and is also widely distributed in Tropical Africa.

16. *Melierax gabar*, Layard.—(RED-FACED GOSHAWK).

Found throughout Africa from Egypt to Cape Colony. Fairly common near Grahamstown.

With *Cinnyris afer*, Linn. (GREATER DOUBLE-COLLARED SUNBIRD) a species common in Eastern Cape Colony.

17. *Vinago delalandei*, Salv.—(DELALANDE'S GREEN PIGEON)
2 males.

Found in South Africa from Kingwilliamstown eastwards and extends to Mombasa and Lake Nyassa.

## Pictures of Reptiles.

18. *Dispholidus typus*, Boul.—(BOOMSLANG).

The Boomslang is a non-poisonous snake, very common in South Eastern Africa. Its food consists chiefly of frogs and small birds.

19. *Chameleon namaquensis*. A. Sm.—(CHAMELEON), on *Tarchonanthus camphoratus*, L.

This is the largest kind of South African Chameleons. It is found in the Orange River Colony, Griqualand West and further West in the driest parts of South Africa.

## Pictures of Moths and Butterflies.

**MOTHS.**

20. *Pachypasa* n. sp.?
Male, female, caterpillar and pupa.

21. ?
Male, female, caterpillar (in outline only), pupa with the foodplants of the caterpillar (?), *Pellaea hastata*, Link and *Asplenium cuneatum*, Lam.

22. *Trabala ochroleuca*,
Male, female, caterpillar and pupa on the foodplant, *Bougainvillea* sp.

23. *Parasa amoema*, K.
Male and cocoons on *Acacia caffra*, Willd.

**BUTTERFLIES.**(1)

24. *Meneris Tulbaghia*, Linn.
Male and female on *Rumex sagittatus*, Thunb. (the foodplant of the caterpillar ?)

This butterfly is peculiar to South Africa and found generally where mountains or high rocky hills exist.

25. *Acraea Horta*, L.
Male, female, caterpillar and pupa.

Widely spread in South Africa and extending into Tropical Africa.

26. *Acraea Rahira*, Boisd.
2 males showing upper and lower surfaces of the wings, one female, caterpillar and pupa on *Polygonum tomentosum*, the foodplant of the caterpillar.

This species is almost confined to marshy or swampy spots.

27. *Pyrameis Cardui*, L.
2 representations of the typical form and 2 of a slightly aberrant form, in both cases upper and lower surfaces of the wings shown; caterpillar, pupa and cocoon on *Urtica dioica*, one of the foodplants of the caterpillar.

This caterpillar has an almost world-wide range. It is widely spread in South Africa, and in many places very common.

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(1) The notes on geographical distribution of butterflies are taken from R. Trimen, "S. A. Butterflies" Vol. I-III (1887-89).

28. *Eurema Hapaneus*, Hüb.

Two females, showing upper and lower surfaces of the wings, the two forms of caterpillar [described by Trimen in his "South African Butterflies," Vol. I (1887), p. 205] pupa and cocoon on *Cetica mitis*, the foodplant of the caterpillar.

Found in the coast regions bordering the Indian Ocean in South Africa, and extending to Madagascar and Abyssinia.

29. *Precis Sesamus*, Trim., *var.*

Two specimens showing upper and lower surfaces of wings.

This species is found from the Perie Bush eastwards to South Tropical Africa.

30. *Precis Pelasgis*, God.

Two females, showing both surfaces of the wings with a branch of *Plectranthus laxiflorus*, Bth., on which Mrs. Barber observed the female of this species depositing eggs.

Found in South Eastern Africa and extending to the Victoria Nyanza.

31. *Diadema Misippus*, L.

Two males, showing upper and lower surfaces of wings, 1 female, 2 caterpillars on their foodplant (*Portulaca oleracea*, L. and a pupa.

This butterfly is generally distributed over South Africa, except in the S. W. of Cape Colony, where it only occurs as a straggler; it extends through Tropical Africa to Southern Asia, the Malayan Archipelago and to South America.

32. *Charaxes Jahlusa*, Trim. ?

Two females, showing both surfaces of the wings.

Charaxes Jahlusa is a rather rare species. It is found in some parts of the Eastern Districts of Cape Colony, and is also known from the Zambesi and Tati Rivers.

33. *Charaxes Xeanthes*, Hew.

Male and female on a branch of Assegai wood (*Curtonia capensis*, L).

This species is restricted to South Eastern Africa.

34. *Myrina ficedula*, Trim.

Two males, showing both surfaces of the wings, caterpillar and pupa on a branch of a Wild Fig (*Ficus sp.*) one of the foodplants of the caterpillar.

Found in Cape Colony from the Knysna eastwards, also in Natal, the Transvaal, and at the Congo.

35. *Hypolycaena Lava*, L.
Two males showing both surfaces of the wings, caterpillar and pupa with two leaves of *Cotyledon undulata*, Haw., the foodplant of the caterpillar.

Found in most parts of South Africa and extending to Abyssinia.

36. *Lycaena Baetica*, L.
Two males, showing both surfaces of the wings, 1 female, caterpillar and pupa with a branch of *Crotalaria capensis*, Jacq., the foodplant of the caterpillar.

This species is widely distributed through most parts of Africa, but is also found in Europe, Asia and Australia.

37. *Lycaena lucida*, Trim.
Two males, showing both surfaces of the wings, and 1 female with branches of *Lebeckia mucronata*, Bth (?) and *Indigofera* sp.

This species extends from Plettenberg Bay to the Transvaal through the coast districts of Cape Colony and Natal.

38. *Callidryas florella*, Fab.
Two males and two females (yellow form) showing both surfaces of the wings, caterpillar and pupa on one of the foodplants of the caterpillar (*Cassia obovata*, Collad).

This butterfly ranges over all the Ethiopian region (except the North West extra-tropical tracts). In South Africa it is generally distributed.

39. *Colias Electra*, L.
Two males, showing both surfaces of the wings, normal form of female, dimorphic form of female, caterpillar and pupa, branches of *Indigofera poliotes*, E. Mey, and *Trifolium Burchellianum*, two of the foodplants of the caterpillar.

This species is distributed throughout South Africa, and extends far into Tropical Africa.

40. *Pieris Hellica*, L.
Two males, showing both surfaces of the wings, 1 female, caterpillar and pupa on *Lepidium sp.*, one of the foodplants of the caterpillar.

This is one of the commonest and most abundant butterflies in South Africa.

41. *Papilio Lycœus*, Doubl.
Two males, showing both surfaces of the wings, caterpillar and pupa with branch of one of the foodplants of the caterpillar (*Toddalia lanceolata*, Lam.)

Common and widely spread over Eastern South Africa.

## Pictures of Plants.

Nat. Order. IRIDACEAE

42. 1. *Antholyza revoluta*, Burm.—Extends from South Western Cape Colony to Grahamstown.

2. Gladiolus sp.

3. Gl. sp.

4. *Acidanthera platypetala*. Bak. ex. descr.—This species is known from Uitenhage to Natal and also from the Transvaal.

43.—1, 2. *Dierama pendula*, Bak.—Found in numerous localities in South Eastern Africa. The colour of the flowers varies from white to pale or dark mauve-purple.

Nat. Order AMARYLLIDACEAE.

3. *Lapeyrousia cruenta*, Bak.—Found from Grahamstown to Natal and the Transvaal.

44. *Hæmanthus magnificus*, Herb. ex descr.—Natal to Delagoa Bay.

45. *Cyrtanthus sanguineus*, Hook.—Natal.

Nat. Order ARACEAE.

69. *Dracunculus vulgaris*, Schott. — A native of the Mediterranean region.

Nat. Order PROTEACEAE.

46. *Protea hirta*, Kl.
"This lovely Protea is somewhat common on the high rocky hills near Johannesburg" (M.E.B.)

Nat. Order RANUNCULACEAE.

47. *Clematis Stanleyi*, Hook.
"Transvaal! Flek poort river, on the hills near the celebrated Black Reef, high hills beyond Johannesburg"

(M.E.B.) According to the Flora Capensis it occurs at the Magaliesbergen and in Zululand.

Nat. Order CUCURBITACEAE.

48. The picture represents a fruiting branch of a cucurbitaceous plant which at present cannot be determined.

Nat. Order RUBIACEAE.

49. ***Burchellia capensis***, R. Br.—A shrub or tree, 12-14' high, called by the Dutch "Buffeldoorn," found from Swellendam to Natal, common near Grahamstown.

Nat. Order ASCLEPIADACEAE.

50 *Huernia reticulata?*

"Hab., Thorn River, Queenstown district; Albany district near Grahamstown, widely dispersed" (M.E.B.)

51 *Huernia tabata*, Haw.

Hab, Karroo.

52. *Huernia sp.*

"Hab.,—Kaffraria. Kreli's Kraal, Tsomo-river" (M.E.B.)

53 *Duvalia Jacquiniana*, Sw.

"Hab.—Bushmans river, Fish River, Great Karroo Flats—beneath sheltering shrubs or rocks. Blossoms in spring after the rains have fallen" (M.E.B.)

54. *Caralluma lutea*, N.E.Br. (Hook. Ic. Plant. plate 1901).

"Hab.—Orange River on rocky hills near Kimberley, Barkly West on Vaal River, Hopetown district on stony hills" (M.E.B.) Mrs. Barber further wrote "This beautiful species I am sorry to say is still unfinished. It has a lovely purple fringe which I cannot trust myself to paint with the living flower."

55. *Stapelia hircosa*, Jacq., var.

This is probably one of the species of Stapelia received by Mrs. Barber from Sir Henry Barkly who gives as localties for it, between Murraysburg and Richmond, and Orange River, (see N. E. Brown in Hook. Ic. Pl. sub. t. 1910).

56. *Stapelia variegata*, L., var. bufonia, N. E. Br.

57. *Stapelia glabricaulis*, N. E. Br.

"Hab.—Kaffraria; Keiskama river; Kingwilliamstown; Lower Fish River. In edges of wood or large bushes in shady localities" (M.E.B.)

58. *Stapelia patula*, Willd. var.

Received by Mrs. Barber from Sir Henry Barkly,—Grows near Ceres (fide Pillans, jr.).

59. *Stapelia patula*, Willd, var.

Received by Mrs. Barber from Sir Henry Barkly.—Grows near Ceres (fide Pillans, jr.).

60. *Stapelia tsomoensis*, N. E. Br.

Hab.—Tsomo river, (N. E. Brown in Hook. Ic. Plant. t. 1918).

61. *Stapelia sp.*

Hab.—Baviaansriver.

62. *Stapelia horizontalis*, N. E. Br. (Hook. Ic. Plant. t. 1907).

This species is placed by Mr. R. Schlechter (Journ. of. Bot. 1896, p. 484) under S. variegata, L., from which, however, it seems to be distinct. It was received by Mrs. Barber from Sir Henry Barkly and Col. Bowker, but she did not mention any locality.

63. *Stapelia hirsuta.*, Jacq. "The Black Stapelia."

"Hab.—Orange River Colony on rocky kopjes near Bloemfontein, also Boshof" (M.E.B).

64. *Stapelia n. sp.?*

Found in the neighbourhood of Grahamstown.

65. *Stapelia roriflua* (G. Don).

66 *Stapelia grandiflora*, Mass.

"Hab.—A widely dispersed species found all over the country" (M.E.B.)

67. *Stapelia sp.?* (market in pencil "quite new genus ?")

"Hab.—Grassy hills near Grahamstown, Botha's Hill, nearly allied to *L. grandiflora*, a very beautiful species "(M.E.B.)

68. *Stapelia ambigua*, Mass.

"Hab.—Orange River Colony, rocky hills in the neighbourhood of Bloemfontein, near Aliwal North on banks of Orange River" (M.E.B.)

## Descriptions of three new species of Hymenoptera from Pearston, South Africa.

By P. Cameron.

### Chalcididae.

*Torymus Mesembryanthemumi*, sp. nov.

Head dark green with brassy tints and covered thickly with glistening white hair; mandibles dark rufous at the base; the scape of antennæ rufous, the flagellum black. Upper part of thorax dark green largely tinted with brassy and rufous tints; the pleurae similarly coloured, the posterior smooth part of the mesopleuræ with purple and violaceous tints. Legs dark blue with brassy tints, the apex of the femora, tibiæ and tarsi pale yellow. Abdomen dark blue, with green and violaceous tints; the ovipositor slightly longer than the body. Wings clear hyaline, the nervures black.

Length hardly 3, terebra fully 3 m.m.

Antennæ stout; the annellus distinctly narrower (about half its width) than the following joint; the scape not reaching to the ocelli, slender, not dilated at apex. The 3 mandibular teeth not clearly separated. Eyes brownish, glabrous. There is a broadish, flat keel below the antennæ. Face sparsely punctured. Pro-mesonotum and scutellum closely and destinctly punctured, the metonotum less strongly punctured, especially in the middle which is bright rosy in colour. The 2nd and 3rd segments of the abdomen are purple, the 1st green with slight brassy tints, the other segments green, blue and brassy.

This species was bred by Dr. Robert Broom, C.M.Z.S., from a gall in the buds of a species of *Mesembryanthemum* found in the veldt at Pearston, South Africa. The maker of the gall is unknown.

BRACONIDAE.

*Chelonus Robertianus*, sp. nov.

Black : the knees and the anterior tibiæ dark testaceous ; an obscure testaceous spot on the sides of the basal abdominal segment ; the wings hyaline, the stigma blackish, the nervures paler.

Length nearly 2 m.m.

Hab. - Pearston, South Africa. Dr. Robert Broom, C.M.Z.S., Antennæ not quite so long as the body, 18-jointed. Head shining, alutaceous : the front with a pyriform depression. Thorax closely and finely punctured the scutellum is less strongly punctured and is more shining, there is a fine transverse keel across the apex of the mesonotum : immediately behind it is a striated band ; there is a shining, smooth band at the sides of the post-scutellum. In the centre of the median segment are 2 longitudinal keels : the sides in the centre are indistinctly toothed : the segment is more coarsely punctured than the mesothorax ; the metapleuræ at the base obscurely striated. Abdomen roundly convex above ; almost uniformly finely rugose, the apex finely obscurely reticulated ; it is slightly, but distinctly, shorter than the head and thorax united and longer than the latter ; the sides, next to the ventral surface, are keeled ; the ovipositor projects,--the apical segment bluntly rounded. Pterostigma large, broadly rounded below ; the radius issues from its centre, its basal abscissa is short, straight, oblique ; the apical is slightly roundly curved downwards, the 1st transverse cubital nervure is almost obsolete, as is also the cubitus beyond it.

VESPIDÆ.

*Rethus Broomi*, sp. nov.

Black : the clypeus, a narrow line on the base of the pronotum, post-scutellum, the apex of the 1st and 2nd abdominal segments all round, the apices of the 4th to 7th beneath, and a narrow line on the outer orbits, yellow ; the antennæ for the greater part beneath a narrow line on the apex of the pronotum, the propleuræ, except at the apex above, tegulæ, a mark below the tegulæ on the mesopleuræ, the scutellum, except narrowly in the centre, the sides of the metanotum broadly, the dilated part

of the petiole broadly on the sides and narrowly behind the yellow apical band above, an irregular mark, broadly dilated in the middle, on the sides of the 2nd segment and the greater part of the apical segments, rufous. Wings fuscous-violaceous, the nervures and stigma black. Legs for the greater part rufous.

Length to end of 2nd abdominal segment 8 m.m.

Hab. Pearston, South Africa (Dr. Robert Broom, C.M.Z.S.) Head and thorax closely punctured and densely covered with cinereous pubescence. Third joint of antennæ as long as the following two joints united, the claw as long as the apical two joints united. Clypeus twice longer than broad roundly convex in the middle; the sides at the apex roundly curved: the apex with a shallow, rounded incision. Hinder ocelli separated from each other by a distinctly greater distance than they are from the eyes. The central depression on the metanotum is broad, deepest at the apex and with a narrow, distinct furrow down the centre. The 4 front femora are black above; all the coxæ are black at the base; the hinder trochanters, and femora, their tibiæ behind and the apical 4 joints of the tarsi, black; the metatarsus dark rufous. The petiole is as long as the head and thorax united, is slightly furrowed down the middle and distinctly punctured except at the base; the 2nd segment is twice longer than the width at the apex; it is distinctly narrowed at the base. Apical half of the mandibles rufous; the palpi black. There is a minute yellow mark above the antennæ.

This species comes near to *Z. delagoensis*, Schult, of which the female only is known. Apart from differences in colouration *Z. delagoensis* may be known by the hinder ocelli being separated from each other by the same distance they are from the eyes, by the petiole being only of the length of the thorax and by the clypeus being transverse. The genus *Zethus* seems to be rare in Africa.

On some South African Grasses in the Herbarium of the Albany Museum. By Prof. E. HACKEL, S. Pölten, Austria.

*Poa heterogama*, Hack., n. sp.

Perennis, caespitosa, innovationibus intravaginalibus. Culmi erecti, gracillimi, circ. 35 cm. alti, compressi, glaberrimi, superne longiuscule nudi, binodes, nodo superiore infra medium culmi sito. Vaginae arctae, internodiis breviores, compressae, glabrae, sursum scaberulae, vetustae inferiores demum in fibras parallelas v. flexuosas tenues flavescentes solutae. Ligulae 1—2 mm. longae, late ovatae, obtusae, denticulatae. Laminae anguste lineares, acutiusculae, planae, inferiores 12—20 cm., summa ad 3 cm. longae, 1 mm. latae, flaccidae, virides, scabrae, tenuinerves. Panicula ovata v. ovato-oblonga circ. 7 cm. longa, patula, laxa, flaccidula, rhachi laevi, ramis binis subcapillaribus scabris in $^2/_3$ inferiore indivisis, primario inferiore paniculam dimidiam aequante v. superante apice 5—6-spiculato, secundariis 2—4 spiculatis, spiculis in apice ramorum confertis breviter v. (subterminales) brevissime pedicellatis. Spiculae ovali-oblongae circ. 4 mm. longae, 2—3 florae, flore imo masculino vel hermaphrodito, 1—2 superioribus femineis, pallide virides, rhachillae glabrae internodiis gluma fertili 5—6-plo brevioribus. Glumae steriles subaequales, 2 et 2·5 mm. longae, lanceolatae, acutae, laeves, I. 1—II. 3-nervis, dimidiam longitudinem floris superpositi tegentes. Glumae fertiles oblongae, fere 4 mm. longae, obtusae, apice hyalinae, ceterum subherbaceae, 5-nerves, nervis parum prominulis, in $^1/_4$ inferiore nervorum laxissime et brevissime v. obsolete pilosulae, callo glabro, laeves. Palea glumam subaequans oblonga, obtusiuscula, bidentula, carinis scaberula. Floris infimi stamina 3, antheris linearibus 2 mm. longis; florum superiorum ovarium ovoideum, stigmatibus sessilibus longis.

Kentani, alt. 1000', Aug. 1902, leg. Miss Alice Pegler, No. 50.

Species peculiaris, nulli arctius affinis. Structura spicularum accedit ad *P. annuam L.*, *et P. dimorphantham* Murb. (Contrib.

Fl. N. Ouest Afr. p. 20), quarum flos supremus in quavis spicula feminius, inferiores hermaphroditi sunt. Sed haec species a nostra valde differunt radice annua, glumis fertilibus ad nervos sericeo-pilosis etc. Flos infimus in P. heterogama modo hermaphrodito (ovario minus evoluto quam in superioribus) modo mere masculino: in superioribus nullum vestigium staminarum adest.

*Calamagrostis Huttoniæ*, Hack. n. sp.—Mrs. C. Hutton, No. 384 (Howick, Natal, Dec. 1902).

This number includes 2 different plants: a number of stalks (but only one leaf) torn off high up with inflorescence which undoubtedly belongs to a species of Calamagrostis, for the valve has at the base a tuft of hair of nearly its own length and it has besides a very short bearded prolongation of the axis on the same side as the pale, therefore belongs to the subgenus *Deyeuxia*. The species is certainly new, but cannot be thoroughly diagnosed as the lower parts are completely wanting and I must delay drawing up a description until more complete specimens have been collected, but there is another matter to be cleared up. With the specimen there was a single, complete, flowering stalk, which represents *Agrostis lachnantha*, Rees, only slightly differing from the type. Both grasses, therefore, grow at the same place, and it is now remarkable to notice that almost all characters (leaves, spikelets, relative sizes, form and nervation of the glumae steriles and glumae fertiles) agree in both, the only difference is in the indument, for *A. lachnantha* has at the base of the valve only short hairs and just such hairs at the sides and on the back; it is entirely without the prolongation of the axis. The present material is insufficient to decide in what relation the two grasses stand to one another. It is very desirable that more material be procured. Perhaps we may be dealing with a hybrid form?

*Sporobolus pectinatus*, Hack. (Oestr. Botan. Zeit. 1903, p. 198) var. (nova) *coloratus*—differt a typo non solum colore subfusco spicularum sed etiam gluma I 1/3 spiculae aequans (non 2/3 ut in typo).

Johannesburg, Mrs. C. Hutton, No. 253, April 1896.

*Panicum quadrifarium*, Hochst.

Warrenton, Miss C. Adams, No. 47, April 1902.

This species is omitted in Flora Capensis, Vol. VII.

On some new and some little known species of South African plants. - II.

By DR. S. SCHÖNLAND.

*Crassula Kuhnii*, Schönl, n. sp.—A small shrublet, 8-12 cm. high. Stem usually much branched from the base. Older branches efoliate, ultimate branches with 8–10 pairs of closely set leaves, leafy portion about 2.5 cm. long, internodes about 2.5 mm. long. Leaves glaucous, slightly connate at base, glabrous, oblong, acuminate, very convex on the back, nearly flat inside, lowest 11 mm long, upper gradually smaller. Inflorescence terminal, pedunculate, subcapitate. few-flowered. Peduncle slender, 5-5.5 cm. long, provided with 3-4 pairs of depauperated leaves. Flowers shortly pedicellate, bracts and bracteoles toothlike. Calyx-lobes ovate, obtuse, c. 2 mm. long, connected at the base, rounded on the back, yellowish white. Petals nearly free, suberect, oblong, 6 mm. long, creamy-white, with the barest indication of a rounded "mucro" behind the apex. Stamens, slightly smaller than the petals, filaments filiform, white, anthers blackish-brown, ovate. Carpels nearly as long as the stamens, ovaries suboblong, almost straight along the inner margin, style subulate, sharply defined, but only 1 mm. long, stigma distinct, squamae very small, broader than long, deeply emarginate above.

Western or Central Karroo? Contributed by Mr. A. Kuhn, May 1903.

This species is allied to Cr. Harveyi, Britt. et. Bak. fil. (Cr. alpetris, Harv. [non Thunb]). It is easily distinguished by its style, calyx-lobes, length of peduncle.

*Crassula corymbulosa*, Link.—At least 4 well marked varieties which remain constant under cultivation, can be distinguished. They die down every year to the base of the stem and shoot out again from the lowest nodes which take root (in the same manner in which *Cr. stachyera*, *Cr. Turrita* &c., persist from year to year). In addition to this mode of vegetative re-

production varieties *c* and *d* have the peculiarity (which is especially pronounced in *d*) of shedding their upper leaves before the flowers open. At the base of each leaf a bud arises (in *c* frequently before they are dropped, in *d* soon after) which soon takes root and forms a most effective means of propagating the plant. It is interesting to note that in *c* where this peculiarity is present but not so pronounced as in *d*, the flowers are not produced in such abundance as in *a* and *b*, while in *d* there are only very few flowers produced at the end of each branch and vegetative shoots (bulbils) formed even in the axils of the bracteoles. In all 4 varieties the leaves are punctulate above and below and in all of them (except *c* which is quite glabrous) the number and distribution of the papillose hairs on the stem is variable. The floral characters in all of them are essentially the same except that there are considerable differences in the sizes of the various parts. The squamae are subquadrate, rounded and emarginate above, small, yellowish. The following distinguishing characters have been drawn up from live plants; in dried specimens it is not always possible to distinguish *a* and *b*. All 4 varieties flower in March and April.

Var. *a. typica.*—Stem usually 25-30 cm. long. Lowest leaves lanceolate, about 7 cm. long, ascending, concave on the inner surface, convex on the outer, margin papillose-ciliate; upper leaves almost at right angles to the stem, ovate-acute, slightly convex on the inner surface. Flowers pedicelled. Petals 3 mm. long, 1·75 mm. broad; calyx-lobes deltoid, 1.25 mm. long; stamens 2.5 mm. long; carpels 1·5 mm. long; style short, but distinct.

Sheldon, Mrs. C. Hutton.

Var. *b. major.* Stem frequently 40 cm. long. Lowest leaves frequently 14 cm. long, otherwise very much as in *a* except that they frequently show a tendency to become ensiform; upper leaves ascending, ovate-lanceolate, concave on the inner surface. Flowers pedicelled; petals 3.25 mm. long, 1.25 mm. broad. calyx-lobes sublanceolate, 2.25 mm. long; stamens and carpels very much as in *a*.

Common near Grahamstown and in Lower Albany.

Var. *c. lanceolata.*—Stem usually about 24 cm. long, not so robust as in *a* and *b*. Leaves without marginal papillae, lowest ascending or deflexed, 3-4 cm. long, lanceolate, nearly flat on the inner surface, convex and subcarinate on the outer surface, upper leaves deciduous and deflexed, usually ovate, acute or ovate-lanceolate, otherwise like the lower ones, but smaller. Flowers subsessile, petals 2.5 mm. long, 1 mm. broad; calyx-lobes

deltoid, 1 mm. long; stamens 2 mm. long; carpels 1.3 mm. long; style very short.

Found near Port Alfred and Carlisle Bridge. To this variety must also be referred some specimens collected by T. R. Sim (No. 1209, Kingwilliamstown, alt. 1200', Nov. 1892), while some of E. E. Galpin's specimens from Queenstown (Nos 1985, 1986, alt. 3500-4000', Feb., March, 1896) show most of the characters of this variety, but their leaves have papillose-ciliate margins.

var. *d. cordata.*—Stem more richly branched than in the preceding varieties, about 15 cm. high. All leaves with papillose-ciliate margin, short and thick, convex above and below, lowest ovate-oblong, acute, about 2 cm. long, 9 mm. broad, 4 mm. thick, gradually getting smaller, however in the ultimate branches they have all, except those close to the apex, about equal size. In these ultimate branches they are heart-shaped, 5-7 mm. long, 4-6 mm. broad, closely crowded together, and drop off just before the flowers open. Inflorescence few-flowered, terminal or sub-terminal, sessile. Flowers shortly pedicellate; calyx-lobes deltoid, 0.75 mm. long; petals 2.5 mm. long, 1 mm. broad; stamens 2 mm. long; carpels 1.1 mm. long, style nearly half the length of the ovary, thick.

Sheldon, Mrs. C. Hutton.

A plant collected at several places in Natal by Mr. J. M. Wood (Nos. 942 and 5346) recently described as *Crassula brevistyla*, Bak. fil. (Bull. de l' herb. Boiss. tome III, 2 me série, 1903, p. 813); was considered by me some years ago to be *Cr. corymbulosa*, Link var. I have not seen it recently, but I think the determination was correct. One peculiar feature found in this, and very few other species of *Crassula*, namely the ciliae on the inner margin of the carpels, is present in *var. a*, *b*, and *d*, and is indicated in *var. c*, even when it is otherwise quite glabrous.

*Crassula brachypetala*, E. Mey., var. *parvisepala*, Schönl. n. var.—Stem subterete, leaves somewhat shorter than in the type, sepals shorter than the petals.

Bedford, Miss Nicol, No. 93, Ap. 1903; Flats. near Brownlee Station, Kingwilliamstown, alt. 1500', T. R. Sim, No. 1200, Ap. 1892; Dohne Hill, alt. 5000', T. R. Sim, No. 1201, March, 1891; Mount Coke, alt. 2000', T. R. Sim, No. 1416, Oct. 1892.

I have not seen the type of *C. brachypetala*, E. Mey., which is not in Harvey's Herbarium, but judging from the description it agrees with the above-mentioned specimens in many points (stem,

shape of leaves and indument, mode of branching, inflorescence, &c). I append a few notes taken from live specimens received from Miss Nicol: A weak, straggling herb, rooting at the nodes, internodes in the main stem about 3 cm. long, stem subterete, pubescent, leaves ovate acute, on an average about 15 mm. long, subconnate or shortly petioled, thinly pubescent, minutely papillose on the margin. Flowers on filiform pubescent pedicels in terminal umbels, pedicels 5 mm. long (8 to 19 mm. long in Sim's specimens). Sepals lanceolate, $\frac{2}{3}$ the length of petals, keeled, subglabrous (setose along the keel in some of Sim's specimens) with green centre and hyaline margin, petals broadly ovate, acute, minutely apiculate, 4.5 mm. long, white with a faint stripe of green from the apex downwards to the middle: stamens about the length of the sepals, filaments filiform, white, anthers creamy-white, carpels about as long as the petals, ovaries obliquely ovate, white with greenish base, minutely serrate in the median line dorsally, styles subulate, white, nearly as long as the ovaries, squamae minute, thin, white, obcordate, broader than long.

*Crassula Dielsii*, Schönl. n. sp.—A small glabrous herb; stem simple or branched, bearing 2 pairs of foliage leaves. Leaves purpurascent, spreading, or erecto-patent, petioled, membranous, lamina reniform, 5 to 9 mm. broad, either quite entire or with crenate margin, petiole about twice the length of the lamina (up to 9 mm.). Inflorescence terminal, cymose, repeatedly branched, first pedicels 4 to 5 mm. long, others much smaller. Flowers reddish-white, sepals connate nearly half their length, lobes ovate, blunt, c. $\frac{1}{2}$ mm. long. Petals broadly ovate, c. 2 mm. long. Stamens and carpels about the length of the petals. Filaments slender, anthers with broad connective. Styles subulate, a little shorter than the ovaries, squamae very small, broadly obovate-cuneate.

"Clanwilliam, Cedarberge, in rupestribus umbrosis, alt. 1170 m.," Diels, No. 1161.

*Cr. Dielsii* is allied to *Cr. Promontorii*, Schönl. et. Bak. fil., but differs from it in size and several details of floral structure.

*Crassula clavifolia*, E. Mey., var. *marginata*, Schönl. n. var.—Margin of the leaves minutely papillose-ciliate, peduncle minutely pubescent.

Montagu, alt. 300 m., Dr. R. Marloth, No. 3239, Oct. 1903.

*Crassula namaquensis*, Schönl. et Bak. fil. var. *lutea*, Schönl.

n. var.—Petals yellow, sepals not quite so broad as in the type and slightly longer.

Bokkeveld Karroo, alt. 800 m., Dr. R. Marloth. No. 3238, Oct. 1903.

*Crassula* (§ *Sphaeritis*) *remota*, Schönl. n. sp.—A small shrublet, about 17 cm. high. Stem much branched, woody at the base. Older branches efoliate, ultimate branches with 4-5 closely set pairs of leaves. Leaves glaucous, connate, subovate, subacute, rather thick, convex on the back, almost flat above, slightly scabrous, minutely serrulate at the margin, ciliate at the base, lower about 8 mm. long, gradually getting smaller higher up. Inflorescence terminal, subcapitate, pedunculate: peduncle slightly scabrous, provided with 2-3 pairs of lanceolate acute empty bracts, about 2.5 cm. long. Flowers shortly pedicellate, bracts similar to the sepals. Sepals c. 2 mm. long, almost free, lanceolate, bluntish, carinate on the back, glabrous, but with ciliate margin. Petals pale yellow, connate at the base, carinate at the back, panduriform, towards the apex gradually contracted, canaliculate, ⅓ longer than the sepals. Stamens c. 1.5 mm. long, attached to the petals, filaments subulate, anthers oblong. Carpels a little smaller than the stamens, styles very small, ovaries obliquely subovate, squamae nearly ½ the length of the carpels, subcuneate, c. 0·6 mm. long, c. 0·4 mm. broad above.

Naauwpoort, T. R. Sim, No. 4, Dec. 1901.

This is the most Eastern species of the subgenus *Sphaeritis* with which I am acquainted. At first sight it looks as if it was related to *Cr. fruticulosa* (L.?) Harv. and *Cr. Harveyi*, Britt. et. Bak. fil. (*Cr. alpestris*, Harv. [non Thunb]), but the structure of its flower leaves no doubt of its real affinities.

*Cotyledon cuneata*, Thunb.—It seems to me doubtful whether the plant referred by Harvey (Flora Capensis, II, p. 373) to this species, is Thunberg's plant. The following is Thunberg's description (Thunberg's Flora Capensis, ed. Schultes, 1823, p. 395): "C. (cuneata) foliis cuneatis carnosis, hirtis; floribus paniculatis, hirsutis. Folia radicalia, carnosa, cuneiformia, integra, margine purpurea, pollicaria. Caulis herbaceus, teres, erectus, pubescens, viscidus, spithamaeus. Flores lutescentes, viscidi. panicula composita, cernua, pedunculi et pedicelli villosi, glutinosi. Calyx et corollae extus hirsutae."

I was inclined to refer a plant received from Dr. R. Marloth (No. 3240, Laingsburg, Oct. 1903) to *C. cuneata*, Thunb., but as it

seems impossible to determine accurately which plant Thunberg meant, I think it advisable to describe Dr. Marloth's plant under a new name *(C. glutinosa)*. It is certainly distinct from *C. cuneata*, Harv.

*Cotyledon glutinosa*, Schönl. n. sp.—Stem short, laxly branched, herbaceous, terete, pubescent. Leaves opposite, 4-6, crowded towards the end of the branches, cuneate oblong, thick, fleshy, 2.5 to 4.5 cm. long, 3 to 5 mm. thick. 8-12 mm. broad, usually subacute and sometimes submucronate, almost flat inside, very convex on the back, mealy-white or glaucous, covered all over with very short soft hairs, apical margin red. Inflorescence terminal, few-flowered, cymose, flowers cernuous; peduncle terete, hirsute, 5 cm. long, pedicels pubescent, 3-8 mm. long. Calyx with dirty reddish-brown pubescence outside, tube about 2 mm. long, lobes ovate, spreading, about 2.5 mm. long and broad; corolla about 13 mm. long, pubescent outside, tube about 7 mm. long, lobes spreading, about 6 mm. long, dirty reddish-brown on the outside which colour is continued in 5 stripes downwards on the tube separated by yellowish-green stripes on which the pubescence is rather scanty; filaments without hairs, scarcely dilated at the base, yellowish-green, about 1 cm. long. anthers reddish-brown, ovate; styles eventually slightly exceeding the stamens, yellowish-green, stigmata small, squamae small, about 3 times broader than high.

The hairs on the peduncle, pedicels, calyx and corolla are glutinous, hence the name.

*Cotyledon Bolusii, Schönl.*, var. *karrooensis*, Schönl. n. var.

Differs from the type chiefly by its smaller calyx lobes which are scarcely 1.5 mm. long.

Laingsburg, Dr. R. Marloth, No. 2519, Jul. 1902; flowered in Grahamstown, March 1904.

*C. Bolusii*, Schönl. was described by me (Rec. Alb. Mus. I, p. 59) from dried specimens. As I have a live specimen of the var. *karrooensis* before me, I will give a full description of it.

Whole plant quite glabrous (with the exception of the throat of the corolla which is papillose). Stem ascending, upright in the upper ⅓, fleshy, about 5 cm. high, knobby at the scars of the old leaves, bearing 3 pairs of subrosulate leaves at the apex. Leaves spathulate, subpetiolate, thick, with a sharp cartilaginous straight or more or less deltoid edge above, both surfaces dull green with copious very minute whitish spots, the oldest and largest 4 cm. long, 2½ cm. broad, 1½ cm. thick. Peduncle terminal, simple,

terete, 4½ cm. long, provided with a few sterile, deltoid bracts, pseudo-spike evidently injured at the apex and (probably as a consequence) compound, bracts small, broadly deltoid, acute. Flowers shortly pedicelled, secondary ones almost sessile: buds green, red-tipped: calyx lobes deltoid, acute, 1½ mm. long, green: corolla-tube green, subcylindrical, with a very slight convexity dorsally, c. 11 mm. long, lobes pale pink with darker centre, broadly ovate, acuminate, somewhat twisted and gently reflexed: stamens and styles not exceeding the open corolla; filaments glabrous, yellowish; anthers oblong, apiculate, pale yellowish: styles greenish, stigmata small, squamae minute, broadly cuneate, deeply emarginate above, white.

*Aloe Boylei*, Bak.—One live specimen was contributed by Mr. W. G. Bennie, B.A. It was found on the Untuntloni Mt., Tembuland, alt. c. 4,500′. The following notes were taken from this specimen: Sub-acaulescent; roots thick, fleshy; leaves 8, subdistichous, c. 17 cm. long, up to 4 cm. broad below, strapshaped below, tapering gradually in the upper half to a blunt point, apex dead in the older leaves, margin curved inwards near the apex, rather soft, fleshy, almost plain on the surface, slightly convex on the back, faintly but distinctly lineate on both surfaces, glaucous, unspotted except at the base, where a few slightly raised irregular white spots are found on the front and back, marginal prickles 1—1½ mm. long, white, not very rigid, very irregular in form and not evenly distributed, more or less confluent into a horny border. Peduncle robust, about 25 cm. long, light green, with a low sharp ridge on one side in the lower portion, otherwise terete, with a few ovate-acuminate empty bracts; inflorescence dense, corymbose, bracts ovate-acuminate, membranous, light coloured with dark veins, c. 1·5 mm. long, pedicels c. 4 cm. long, more or less curved. Flowers proterandrous, perianth subcylindrical, c. 3 cm. long: outer petals slightly shorter than the inner and slightly differing in size amongst themselves, salmon-coloured with darker tips, inner almost white with keel which is pale salmon-coloured below and is green at the apex Filaments very slightly longer than the inner petals, almost white with a yellowish tinge, anthers oblong, 3 mm. long, pale brick-colour, style white, eventually exserted about 5 mm.

*Aloe Peglerae*, Schönl. n. sp.—Acaulescent or with a very short stem. Leaves about 30 in a dense rosette, glaucous, very stiff, incurved, narrowly ovate-lanceolate, slightly convex on the inner, a little more so on the outer surface, outer leaves about 12

cm. long, 3 cm. broad and 9 mm. thick in the middle, marginal spines very pointed, white with brown tips (becoming quite brown in the older leaves), 3-4 mm. long, straight or slightly curved separated by straight inter-spaces which are 3–9 mm. long, a series of prickles also on the back in the median line of about one third of the upper portion and a similar series on the back close to the left hand margin. Inflorescence about 24 cm high, unbranched, peduncle about 12 cm. long, provided with a number of empty broadly deltoid bracts, raceme very dense, multiflowered; flower-bearing bracts deflexed lanceolate-acuminate, about 18 mm. long, membranous, whitish with reddish centre; flowerbuds red, turning partly creamy when open. Perianth slightly curved, about 2.4 cm. long, tube short, stamens about 4 cm. long, exserted about 15 mm., filaments yellow below, dark brown in the upper portion, anthers oblong, yellow; ovary 9 mm. long, style 3.7 cm. long, exserted 1.5 cm., lower portion yellowish, upper reddish-brown.

Rocky hill, just outside Rustenburg, Transvaal, alt. 4,100', Miss Alice Pegler, No. 921, 15th Aug. 1903.

This very distinct new species may be placed near *A. longistyla*, Bak. When sending it, Miss Pegler not inaptly compared its appearance to a loose cabbage.

*Aloe Greatheadii*, Schönl. n. sp.—Caulescent. Trunk ascending 10–12 cm. thick, up to 30 cm. high. Leaves in a terminal dense rosette, lanceolate, outer about 23 cm. long, 6–7 cm. broad low down and 1 cm. thick, slightly incurved, upper surface nearly flat, dark shining green, with numerous elongated whitish spots which, especially in the lower portion, are united into a number of irregular transverse bands, lower surface unspotted, light green, with a few small prickles on the outer surface near the tip, marginal prickles very pointed, usually quite straight, brown, separated by rounded fairly regular interspaces, which are 7–8 mm. long. Inflorescence 60-120 cm. high, usually branched. Peduncle glaucous, subterete, bearing a number of ovate-lanceolate bracts in the axils of which buds are present, when the terminal raceme is in flower. Raceme moderately dense, usually about 15 cm. long, bracts deltoid-accuminate, lower about 15 mm. long, upper gradually smaller. Pedicels usually nearly twice the length of the bracts, but some (in the same raceme) only about $\frac{1}{3}$ their length. Flowerbuds upright, whitish, with 6 broad longitudinal stripes which are dark-green above and become pale-reddish lower down. Open flowers drooping, 3 cm. long; perianth curved, strongly constricted above the base, tube a little over half the length of the

perianth : outer petals, both inside and outside, whitish, with broad pale-red median line, inner petals similarly coloured on the outside, but with yellow margin above and on the inside yellow with reddish median line ; stamens and style slightly exserted, filaments yellow, anthers yellowish on the inside, reddish-brown outside.

In flower at Mapellapoede, N. E. Kalahari (18 miles North of Serowe on the road to Lake N'Gami), Aug. 29th, 1903.

I have pleasure in naming this species after my friend, Dr. J. B. Greathead, who accompanied me on a trip to the N. E. Kalahari, and who first called my attention to it.

*A. Greatheadii* is allied to *A. grandidentata*, Salm-Dyck, which, however, does not develope the thick caudex of the former, and further has the leaves spotted on both surfaces, the perianth tube has not such a decided "bulb" at the base, it is scarcely curved at all, and the stamens and style are more exserted.

*Aloe bamangwatensis*, Schönl. n. sp.--Acaulescent, branching only underground. Leaves about 12 in a dense rosette, ascending and gently recurved at the tip, narrow lanceolate, frequently subensiform in the upper third, 4 cm. broad low down, 30-35 cm. long (in cultivated specimens, about ⅔ this length in wild ones), c. 1·5 cm. thick in the centre, nearly flat on the inner surface, strongly convex on the outer, on both surfaces dark green with large oblong whitish spots, which are, especially in the lower portion, more or less confluent and form irregular transverse bands which are more numerous on the outer than on the inner surface and vary considerably in different individuals, margin spiny throughout, and a few small spines also in the median line on the outer surface near the tip, marginal prickles deltoid-acuminate, sometimes slightly curved, 2-4 mm. long, white or (in older leaves) brown at the tip, separated by slightly rounded interspaces of variable length (3-13 mm.). Inflorescence subterminal, a lax panicle 140-150 cm. high, unbranched part of the peduncle without empty bracts, 40-50 cm. long subterete, subglaucous, bearing at wide intervals 4 or 5 branches about 38 cm. long with racemes about 24 cm. long, the bract bearing the first lateral raceme c. 4 cm. long, sometimes with a few marginal and terminal prickles near the tip, the upper smaller and quite smooth, all lanceolate, pale green, longitudinally striate, clasping, floriferous bracts lanceolate-cuspidate c. 12 mm. long. Flowers very laxly but irregularly distributed, patent or cernuous, pedicels 7-9 mm. long, those of the

upper flowers frequently the longest, perianth 3.1 cm. long, very slightly curved, c. 1 cm. broad at the base and suddenly constricted, forming a flattened bulb, and then gradually widening out again, tube about ⅔ the length of perianth, pale red, faintly striped with darker red on the bulb, lobes with pale red centre which passes into greenish-red near the tip and with almost white broad wings; stamens and style exserted about 3 mm.: filaments flattened, white and broadened at the base, yellow above, anthers oblong, yellowish-red within, reddish-brown outside; ovary 9 mm. long, cylindrical, deeply furrowed, style yellow.

In the bush on sandy ground a few miles west of Palapye Road Station in the country of the Bamangwatos. Flowered in Grahamstown, March 1904.

Like the plants which I take to be varieties of *A. grandidentata*, Salm-Dyck, and which occur at various places in Griqualand West, Cape Colony, *A. bamangwatensis* readily spreads by means of underground suckers, and thus I found it frequently in patches of a variable number of individuals. From *A. grandidentata* it is easily distinguished by the large "bulb" of the flower, the longer bracts and shorter pedicels, from *A. Greenii*, Bak., by the smaller, differently spotted leaves, straighter flowers, shorter pedicels, &c. With *A. Greenii* and *A. Greatheadii*, Schönl. it shares the greatly enlarged base of the perianth, but apart from this the differences in floral structure pointed out between the latter and *A. grandidentata*, Salm-Dyck, also hold good for the present species.

*Androcymbium albanense*, Schönl. n. sp. (Plate V., Fig 1).—Corm oblong, about 1 cm. in diameter, tunics firm, dark brown; underground neck 5-15 mm. long, bearing 5 rather thin foliage leaves. Leaves more or less horizontal, glabrous, green with white margin and brownish base, the two outer plicate, ovate-lanceolate, 7-8 cm. long, the inner shorter ovate. Capitulum 2-5 flowered, up to 15 mm. in diameter; bracts broadly ovate, more or less folded round each flower, about 15 mm. long, pedicels thick, about 3 mm. long. Petals greenish white, about 14 mm. long, claw narrow, a little longer than the cucullate blade; stamens about ⅔ the length of the blades of the petals, filaments from a broad base subulate, reddish brown; anthers subbasifixed, introrse, connective yellowish, broad, pollensacs dark reddish-brown, pollen yellow; carpels sharp-angled on the back, ovaries about the same length as the styles and gradually passing into them, stigmata minute; capsules and seeds unknown.

Amongst grass, near the Brickfields, Grahamstown, alt. c. 2000', Miss M. Daly and Miss M. Sole, Aug. 1903.

This species has some features in common with *A. encomoides*, Willd., but in the latter the pedicels are ¾-1 inch long, the stamens are exserted and the anthers are linear-oblong. It seems, however, to come close to the incompletely known *A. albimarginatum*, Schinz, in which, however, the bracts are ovate-lanceolate, the claw of the petals is as long as the blade and the stamens as long as the perianth segments.

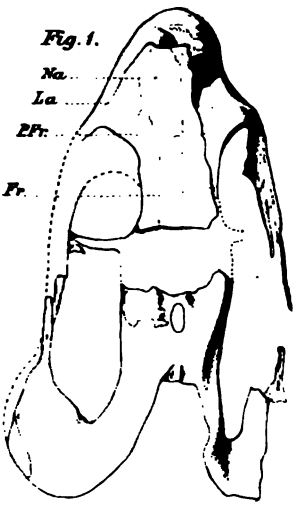
On Plate V, fig. 1, *a* represents a plant in natural size; *b*, bract (nat. size); *c* petal, front and side view (x 2); *d*, stamen (about x 3); *e*, gynaecium (x 2).

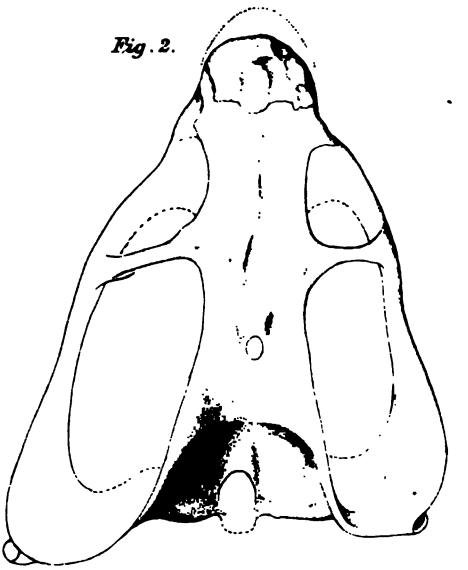
*Andrewsymbium longipes*, Bak.—With this species I have identified a plant which appeared in large numbers amongst grass in the Drostdy grounds, Grahamstown, in Aug. 1903, and which was collected by Miss M. Daly (No. 472). The following are notes taken from some of her specimens :—

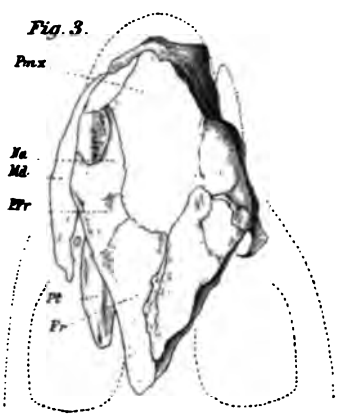
Corm tunicated, about 20 mm. high and broad, but somewhat compressed laterally; underground neck 3.5-4 cm. long, bearing 3-4 sheathing foliage-leaves. Leaves lanceolate, acuminate, the lowest usually 20-30 cm. long, but sometimes reaching a length of 50 cm., 20-22 mm. broad low down, distinctly plicate in the middle, striate longitudinally, especially on the upper surface, glabrous, thin, dark green with narrow whitish margin. Capitulum 1-4 flowered, bracts resembling the foliage leaves, but much smaller, the older flowers larger than the later ones, pedicels very short. Petals 11-18 mm. long, white with a rosy tinge, claw slender, longer than the blade, blade sub-ovate-lanceolate with incurved edges; stamens shorter than the blade of the petals, anthers oblong; ovaries slender, obliquely oblong, about the same length as the slender styles and passing gradually into them. Capsules and seeds not known.

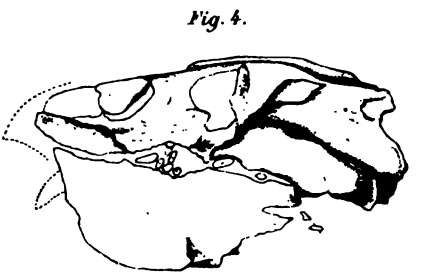
*Anacampseros Alstonii*, Schönl. which was described on p. 51 is represented on Plate V, fig. 2.

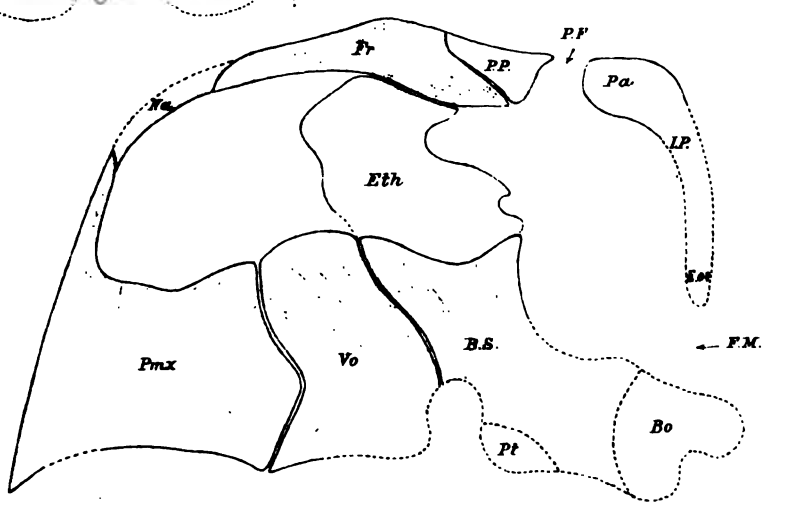
*a*—Whole plant in flower, about ⅔ natural size (from a photograph). *b*—Stamen (x 2). *c*—Gynaecium (x 2). *d*—Longitudinal section through the ovary (x 6).




R. Broom. del.

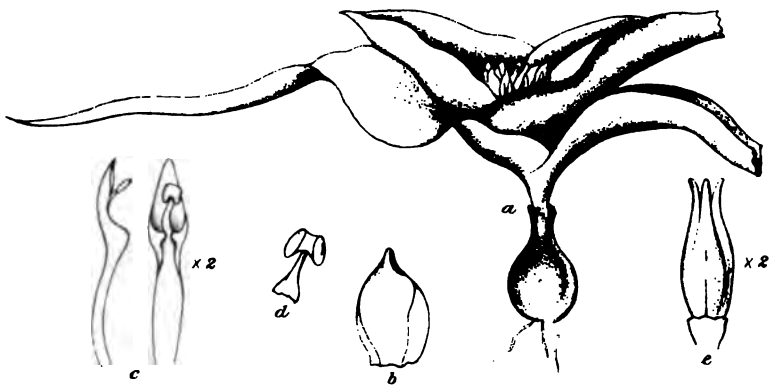
***Fig. 1.*** *Skull of Opisthoctenodon agilis, Broom.*

***Fig. 2.*** *Skull of Oudenodon trigoniceps, Broom.*

***Fig. 3. and 4.*** *Skull of Prodicynodon pearstonensis, Broom.*

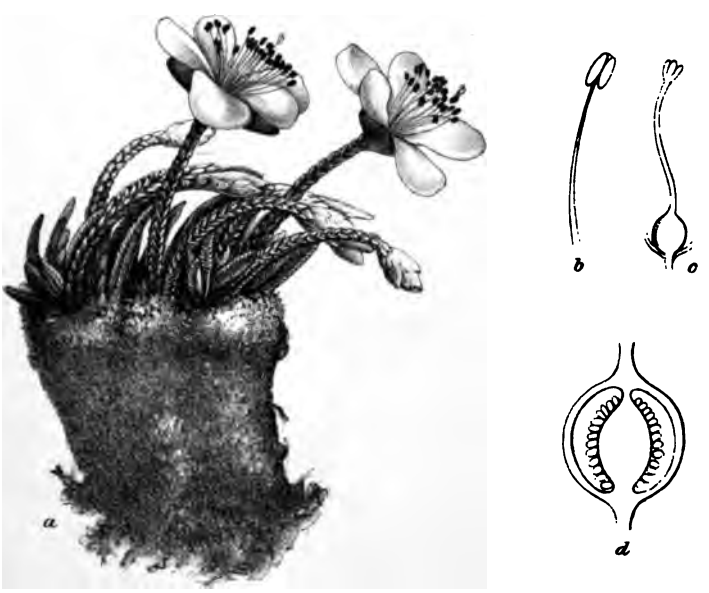
***Fig. 5.*** *Median section of Skull of Lystrosaurus latirostris* Owen.

*Fig. 1.*




*Androcymbium albanense, Schönl.*

*Fig. 2.*




S. S. phot. et del. Lith. Anst. Julius Klinkhardt, Leipzig

*Anacampseros Alstonii, Schönl.*

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# Records of the . . Albany Museum.

## VOL. I.

**PART III CONTAINING:**

Descriptions of New Genera and Species of Hymenoptera from Dunbrody, Cape Colony. By P. Cameron.

On the Hymenoptera of the Albany Museum. First Paper. By P. Cameron.

Notes on two Reptilian Tarsi in the Albany Museum. By R. Broom.

On a new South African Labyrinthodont *(Cyclotosaurus Albertyni)*. By R. Broom.

On a new species of *Oudenodon (O megalorhinus)* from the Gough. By R. Broom.

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The "Records of the Albany Museum" will be issued at irregular intervals, as matter for publication is available.

All communications with reference to them should be addressed to the undersigned.

We hope to be able to present, in a future number, illustrations of the new genera of Hymenoptera described by Mr. P. Cameron in the present number.

Dr. S. SCHÖNLAND,
Director of the Albany Museum,
Grahamstown,
South Africa.

## Descriptions of New Genera and Species of Hymenoptera from Dunbrody, Cape Colony.

By P. Cameron.

For the pleasure of describing the following species I am indebted to the Rev. J. A. O'Neil, S.J., who captured them at Dunbrody. At his suggestion I have sent this paper to Dr. Schönland for publication in the "Records of the Albany Museum" as thereby the descriptions will be easily accessible to South African Entomologists. Many of the species are also to be found in the Albany district as I have observed from a collection just sent me by Dr. Schönland. In addition to the species taken by the Rev. O'Neil I have added descriptions of two or three taken by Prof. R. Broom.

### Ceropalidæ.

*Schizanoplius*, gen. nov.

Apex of clypeus with a semicircular incision in the middle. Labrum bilobate, incised narrowly down the centre. Mandibles with a long apical and a short subapical tooth. Antennæ situated clearly above the clypeus, the 3rd joint long, nearly as long as the 3rd and 4th united. Transverse median nervure placed shortly beyond the transverse basal. Cubitus in hind wing placed shortly before the transverse median; apex of radial cellule triangularly pointed; 3rd cubital cellule wide in front. Metathorax posteriorly rounded, furrowed in the middle, transversely striated. Pronotum, with the basal neck, nearly as long as the mesonotum. Claws with a minute tooth. Wings uniformly fuscous. Front tarsi with long spines on the outer side.

A genus of *Anoplini* easily known by the distinctly incised apex of clypeus, cleft labrum, striated median segment and long, sharply pointed, mandibles

*Schizanoplius violaceipennis*, sp. nov.

Dark brick-red ; the apical 6 joints of antennæ, an oblique mark on the sides of the ocelli touching the eyes and united to a larger, somewhat triangular, spot in front of and touching the anterior, a mark on the propleuræ, the mesopleuræ, mesosternum, median segment, the greater part of the ventral surface of the abdomen, the base of the 1st and the apices of all the segments, the fore coxæ above and the 4 posterior entirely black ; wings fuscous-violaceous, metanotum transversely striated ; the middle with a longitudinal furrow. Female.

Length 18 mm.

Eyes clearly converging above ; malar space very small ; eyes almost touching the base of the mandibles ; tooth of mandibles black ; hinder ocelli separated from the eyes by a greater distance than they are from each other ; temples nearly as long as the scape of the antennæ, rounded behind ; occiput transverse. Pronotum large, but shorter than the mesonotum, its sides rounded ; the base forming a distinct neck ; metanotum clearly longer than it is wide at the base ; its apex with a gradually rounded slope ; 3rd abscissa of radius nearly twice the length of the 2nd ; the 1st recurrent nervure is received near the base of the apical third ; the 2nd shortly beyond the middle of the cellule. The inner spur of calcaria does not reach to the middle of metatarsus ; the underside of tarsi thickly spined ; the tibiæ sparsely spined.

*Anoplius johannis*, sp. nov.

Black, the basal 2 segments of abdomen entirely, and the basal half of the 3rd, red ; wings fuscous-violaceous ; 3rd cubital cellule greatly narrowed in front, being there about half the length of space bounded by 2nd transverse cubital and 2nd recurrent nervure ; transverse median nervure received distinctly beyond transverse basal ; 1st recurrent nervure received in apical fourth, the 2nd very shortly behind the middle of cellule ; cubitus in hind wings almost interstitial, received very shortly behind transverse median. Female.

Length 17 mm.

1st joint of flagellum not quite so long as the 2nd and 3rd united. Pronotum longer than mesonotum, its apex broadly roundly arcuate. Apex of median segment with a rounded slope,

its middle slightly hollowed. Temples small, occiput transverse, margined; apex of clypeus almost transverse, its sides rounded; malar space very small. Eyes converging above, separated by about the length of 1st joint of flagellum. Long spur of hind tibiae not quite reaching to the middle of metatarsus; claws with a subapical tooth.

*Anoplius O'Neili*, sp. nov.

Black, red and yellow, the antennæ rufous; legs rufous; the foretarsi, almost entirely, the middle, except at the apices of the joints, the basal two-thirds of the basal joint of the hinder and the base of the 2nd and 3rd narrowly, bright yellow. Head yellow; the vertex and the centre of the front broadly (the mark slightly narrowed below) a line slightly dilated at the apex, in the middle of clypeus, reaching to the base of the apical third, a somewhat triangular mark on the base of the labrum and the greater part of the occiput, black. Prothorax red, the pronotum broadly yellow; the yellow part irregular above, projecting largely into the middle of the yellow apical part of the mesopleuræ, the projection being black at the apex. Mesonotum black, except for a large yellow mark, cleft at the base, transverse at the apex. Mesopleuræ red, black at the base, above the oblique furrow. Mesosternum for the greater part black; median segment rufous; the lateral apical angles yellow. Abdomen rufous: the base of 1st segment broadly, its apex narrowly black; the basal third of 2nd segment, the base of 3rd, 4th and 5th segments less broadly—the bands incised in the middle and the apical broadly—the bands not incised—yellow. Wings hyaline, tinged with fulvous, the apex from the end of radius, smoky; 2nd cubital cellule about one-fourth longer than the 3rd which is broad in front; 2nd transverse cubital nervure angularly bent backwards below the middle.

This species does not fit into any of Mr. Ashmead's genera, The cubitus in hind wing is received far beyond the transverse median; the transverse basal nervure interstitial; malar space small; apex of clypeus broadly rounded; temples short; hind ocelli separated from eyes by about the same distance they are from each other; median segment with a gradually rounded slope; its apex transverse, with the sides angled. Mandibles bidentate, their apical tooth long and stout; the 1st recurrent nervure is received near the apex of the cellule; tibiæ and tarsi sparsely spinose; claws cleft.

Belongs to the group of *A. multipictus*, Sm.

*Anoplius (Ferreola?) gradatus*, sp. nov.

Black: the legs, except the coxæ, trochanters and base of femora, red; wings uniformly fuscous-violaceous; 3rd cubital cellule in front one third shorter than 2nd; 1st recurrent nervure received in apical third; the 2nd very shortly before middle; transverse median nervure in front, wings interstitial; the long spur of hind tibiæ reaching close to the basal of apical fourth of metatarsus. Male.

Length 10 mm.

Temples very short; occiput transverse. Eyes converging below; the orbits narrowly lined with pale yellow; malar space small, but distinct. Hind ocelli separated from each other by about the same distance as they are from the eyes. 1st joint of flagellum as long as the 2nd. Labrum large, not much shorter than the clypeus, its apex broadly rounded. Pronotum about two-thirds of the length of mesonotum. Median segment large, broader at the base than its length in middle; the apex roundly, but not much, incised; the sides sharply projecting above. First segment of abdomen broad at the base, nearly as long as the following 2 united. Tibial spines long, the tarsal shorter; claws with a stout longish basal tooth.

Looks not unlike *A. tibialis*, Klug; in that species the ocelli are in a triangle; in the present in a curve. The pronotum is nearly, if not quite, as long as the mesonotum. The cubitus in hind wings originates before the transverse median; claws bifid; the basal tooth the shorter and stouter. Head viewed from front longer than wide. First joint of foretarsi shorter than tibiæ.

This species has a great resemblance in colouration and form to *Anoplius labialis*, and might very well be mistaken for the male of that species. *A. labialis* may easily be separated by the interstitial cubitus in hind wings; by the 3rd cubital cellule being more narrowed in front, by the 3rd transverse cubital nervure being more distincly oblique—roundly curved—and by the metanotum projecting more laterally at the apex.

*Anoplius (Schizosalius?) melanostomus*, sp. nov.

Black; the front and vertex (except the ocellar region), orbits (the outer narrowly to the bottom), occiput, prothorax, except the lower part of the propleurae, mesonotum, scutellum and post-scutellum, orange-red; wings dark fuscous-violaceous. Female.

Length 18 mm.

First joint of flagellum not much shorter than the 2nd and 3rd united, the joints brownish below. Occiput transverse; temples small. Eyes curved on innerside; malar space small; ocelli in a curve, separated from each other by a distinctly greater distance than they are from the eyes. Antennæ clearly separated from the clypeus, which has the apex transverse, labrum large, broadly rounded, obliquely depressed. Pronotum nearly as long as the mesonotum, not much narrowed towards the base; its apex broadly rounded. Parapsidal furrows complete, distinct. Scutellum longish, narrowed slightly towards the apex, not much raised. Median segment not quite so long as the mesonotum, transverse behind; a deep furrow in the centre of the apical two-thirds; its apex transverse; apical slope somewhat steep; the sides distinctly toothed at top and bottom. The 2nd cubital cellule is much narrowed in front, being there the length of the space bounded by the recurrent and the 2nd transverse cubital nervures, the latter being straight, oblique; the others rounded. Transverse basal in forewings and accessory nervure in hind wings interstitial. Tibial and tarsal spines short. Claws with a short stout tooth. Radial cellule short; apical abscissa of radius oblique, nearly as long as the basal.

The wings are not much longer than the abdomen; the antennæ short; mandibles with a long apical tooth; the long spur of hind tibiæ reaches to the middle; malar space small; apex of pronotum angularly emarginate; the sides straight and oblique from the middle. Front tarsi without a distinct long comb; the apices of the joints with stiff bristles. Apex of clypeus sinuate. The labrum is larger than usual and is broadly depressed in the middle.

This species fits in, fairly well, with the genus *Schizosalius*, Sauss.

*Anoplius argenteo-decoratus*, sp. nov.

Black, the basal 2 segments of abdomen red; the whole body and legs thickly covered with silvery pile, which forms bands on the abdominal segments; wings hyaline, the fore darker in tint than posterior, the apices of both smoky, the former from the end of radial cellule; 3rd cubital cellule much narrowed in front, there half the length of space bounded by 2nd recurrent and 3rd transverse cubital nervures; 1st and 3rd transverse cubital nervure obliquely bent in front. Female.

Length 11 mm.

Lower part of front, face and clypeus densely covered with silvery pubescence. Eyes roundly curved on inner side, more converging below than above: hinder ocelli separated from each other by a less distance than they are from the eyes. Temples almost obsolete. Occiput transverse. Apex of clypeus broadly rounded. Top part of pronotum slightly shorter than mesonotum, the whole length longer than it. Median segment furrowed down the centre: its apex with a steep slope, the sides slightly roundly projecting: the centre of the slope furrowed. Both the recurrent nervures are received shortly beyond the middle of cellules; apical abscissa of radius oblique, slightly curved upwards. Calcaria and tarsal spines black: the long hind spur reaching beyond middle of metatarsus. The cubitus in hind wings originates beyond the transverse median: the transverse basal nervure interstitial; fore tarsi with long stiff spines on outerside; 1st joint of flagellum distinctly longer than the 2nd. Claws with a minute tooth near the base. The metanotum has the apex transverse at the apex: the middle of the apical slope slightly hollowed; the sides rounded: the base has a narrow but distinct furrow in the middle.

If it were not that the body is densely covered with silvery pile this species might be included in *Arachnophila*, Ashm.

*Anoplius dunbrodyensis*, sp. nov.

Black. Head, pronotum, propleurae, except at bottom, mesonotum and scutellum, red; a triangular black mark on the clypeus, the narrow end above, a mark between the ocelli, a line along the sides of the mesonotum and a mark in its centre at the base—the mark broader than long—black; wings uniformly dark fuscous-violaceous. Female.

Length 11-12 mm.

Antennæ short and stout; the 3rd joint longer than the basal 2 united and not quite so long as the 4th and 5th together. Eyes parallel; hinder ocelli separated from each other by about the same distance they are from the eyes; apex of clypeus broadly rounded; temples short, obliquely rounded; prothorax large, nearly as long as the mesonotum; its apex with the sides slightly obliquely narrowed towards the centre; metanotum broader than long, the apex transverse in the middle, the sides rounded. Apical abscissa of radius with an oblique slope and slightly curved upwards; the 3rd cubital cellule much narrowed in front, being there about one-third of the length of the 2nd; both its nervures are broadly

roundly curved ; 1st recurrent nervure received near base of apical fourth, the 2nd shortly, but distinctly beyond the middle ; accessory nervure in hind wings almost interstitial. Tibial and tarsal spines long and black.

This is probably a variable species as regards the black marks on the head and thorax.

*Anoplius labialis*, sp. nov.

Black ; the basal half of the flagellum of antennæ, the apex of the fore femora and the fore tibiæ dark red ; the apex of middle femora, the posterior, except at the base, and the 4 posterior tibiæ, red ; wings fuscous, the nervures and stigma black ; the 3rd cubital cellule in front not quite one-fourth shorter than the 2nd ; the 1st and 3rd transverse cubital nervures roundly curved ; the 3rd more obliquely bent in front ; 1st recurrent nervure received shortly beyond, the 2nd almost in middle of cellule ; cubitus in hind wings originating before the middle. Male.

Length 7 mm.

Malar space small ; temples very short ; occiput almost transverse. Eyes slightly converging below ; ocelli separated from each other by the same distance they are from the eyes ; clypeus roundly convex, its apex almost transverse. Basal two joints of flagellum equal in length ; labrum large, its apex broadly rounded ; pronotum nearly as long as the mesonotum, rounded in front, its apex broadly rounded ; metanotum not quite so long as the mesonotum, its apex slightly roundly incised ; abdomen sessile ; tibial spines long ; the tarsal shorter and more numerous ; the long spur of posterior tibiæ about two-thirds of the length of the metatarsus ; claws bifid ; the inner claw shorter than outer.

The head is densely covered with long black, the base of the thorax more sparsely with shorter, hair. The apical abscissa of radius is slightly curved upwards. Apart from the difference in size and colour, this species may be known from *gradatus* by the cubitus being clearly received before the transverse median, by the 3rd cubital cellule being wider in front compared with the 2nd and by the eyes not converging in front.

*Anoplius spilopus*, sp. nov.

Black ; the flagellum of antennæ rufous, the 2nd segment of abdomen red ; there is a white line on the apical half of the hind tibiæ ; wings almost hyaline, the apex infuscated ; head thickly

covered with long white hair; the thorax and base of legs with silvery pile.

Length 12-14 mm.

Antennæ stout, the third joint, if anything longer than 4th: temples very short, almost obsolete; the occiput transverse; hinder ocelli separated from each other by a somewhat greater distance than they are from the eyes; clypeus roundly convex, its apex almost transverse; malar space distinct; eyes converging below, large above; the head becomes gradually wider from the top to near the base of the antennæ; pronotum as long as mesonotum, it becomes gradually, but not much, narrowed from the apex to the base; its apex arcuate. There is a narrow, but distinct furrow, on the sides of the mesonotum; metanotum broader than long; the base with a distinct furrow in the centre, which becomes narrowed towards its apex; the apex of the segment has a rather steep slope; its sides project on the upper part, the projection dilated above, and to a less extent below; the upper being rounded; 2nd abscissa of radius longer than 3rd; the apical obliquely curved upwards not very straight; transverse basal nervure interstitial; 1st recurrent nervure received near the base of apical third of cellule; the 2nd almost in the centre; cubitus in hind wings interstitial; 1st and 2nd transverse cubital nervure oblique, straight; the 3rd roundly curved; claws with a median longish tooth; the long spur of hind tibiae extends slightly beyond middle of metatarsus; tibial spines short, sparse; abdomen sessile.

In Ashmead's system this species would come into *Tachypompilus* if it were not that the first joint of the flagellum is not "very elongate."

*Anoplius hirtiscapus*, sp. nov.

Black; the last dorsal segment white; densely covered with silvery pile; the head and thorax densely with long silvery hair; the under side of the antennal scape with longer fuscous hair; antennæ thick, as long as the thorax, the 3rd and 4th joints equal in length; the middle joints slightly produced at their apices below; wings clear hyaline, the apex of anterior smoky from the 3rd transverse cubital nervure; the 2nd abscissa of radius a little shorter than the 3rd; both recurrent nervures received shortly beyond the middle; the transverse median distinctly beyond the transverse basal; the cubitus in hind wings shortly beyond the transverse median. Male.

Length 11-12 mm.

Temples short, largely roundly narrowed; the occiput rounded; eyes converging above; hind ocelli separated by about the same distance from each other as they are from the eyes; apex of clypeus rounded; mandibles rufous near the middle; the subapical tooth stout, longish, rounded at apex. Pronotum not quite so long as mesonotum; its apex rounded. Median segment longer than it is wide at the base, its apex rounded, with an oblique slope and an impressed line in the centre. Abdominal segments with broad bands of silvery pile; the 1st segment at base half the width of apex; it becomes gradually wider towards the apex. Tarsi shortly spined; the hind spurs thick; the longer one reaching close to middle of metatarsus; claws bifid.

The apical abscissa of radius straight, obliquely sloped; 3rd cubital cellule large; its length in front fully half the length of the length behind; eyes separated by a short space from the mandibles. Head in front longer than wide.

*Anoplius trichiocephalus*, sp. nov.

Black; the apical two-thirds of hind femora and hind tibiæ, red; a spot on under side of antennal scape, and on the last abdominal segment, white; wings dark fuscous, the nervures and stigma black; the head thickly covered with long, the thorax with shorter, black hair. Male.

Length 14 mm.

Hab. Pearston (Prof. Robert Broom).

The 3rd and 4th joints of antennæ almost equal in length. Eyes parallel, not converging above or below; malar space small, but distinct. Temples short. Occiput transverse. Hinder ocelli separated from each other by about the same distance as they are from the eyes. Labrum more shining and bare than the rest of the head. Pronotum nearly as long as the mesonotum, which has narrow, shallow, but distinct, lateral furrows. Metanotum nearly as long as the mesonotum, its apex slightly roundly incised; in the middle is a narrow impressed line. Tibial and tarsal spines black, stout and long; the long spur of the hind calcaria not quite two-thirds of the length of metatarsus; the claws with a stout basal tooth; the fore tarsi with short spines, not ciliated. Transverse basal nervure in fore wings interstitial; cubitus in hind wings originating beyond the transverse median; 3rd cubital cellule in front wing half the length of 2nd; the 2nd and 3rd transverse cubital nervures roundly curved; 2nd recurrent nervure received almost in the centre of the cellule.

*Anoplius (Homonotus) spilonotus*, sp. nov.

Black, with a blue tint: the pronotum except for a large mark in the centre—broad in the middle, obliquely narrowed towards the base and apex—an irregular, triangular mark—its length more than the width at the base—in the middle of the mesonotum, the scutellum and the upper part of the propleuræ—the mark continuous with that on the pronotum and broadest at the base—orange-yellow; the hinder tibiæ brownish; wings uniformly dark fuscous, highly iridescent, the nervures and stigma black. Male.

Length 10 mm.

Head short, transverse behind, rounded in front; temples small; eyes reaching to base of mandibles, converging above; ocelli . . . . the hinder separated from each other by a distinctly greater distance than they are from the eyes. Face depressed, the front projecting over it. Apex of clypeus transverse, the sides rounded. Pronotum slightly longer than the mesonotum, narrowed slightly towards the base; the apex almost transverse. Mesonotum and scutellum flat, the latter rounded behind. Median segment longer than the mesonotum, flat, its apex slightly, but distinctly, roundly incised, its sides not projecting much above. Spines on tibiæ and tarsi long; the long spur of hinder calcaria two-thirds of the length of metatarsus. Third cubital cellule much narrowed above—about one fourth of the length of the second; below, shortly but distinctly, longer than it; 1st transverse cubital nervure roundly curved; the 2nd straight, oblique; the 1st recurrent nervure received near the apex; the 2nd shortly beyond the middle of the cellule. The transverse median nervure interstitial; the cubitus received shortly before the transverse median in hind wings. Antennal scape stout, about 3 times longer than broad, cylindrical, narrowed at the base, as long as the 1st joint of flagellum, which is, if anything, longer than the 2nd.

This species has considerable affinity with *H. Wasmanni*, Brauns., which may be known from it by the pronotum being "twice so broad behind as it is long in the middle"; and "the median segment as long as it is broad at the stigmas," while the pronotum in the present species is broader at the apex than it is long in the middle and the metanotum shorter than its width at the stigmas.

*Anoplius (?) cœnoceras*, sp. nov.

Black; the wings uniformly fuscous-violaceous; head, antennal scape, and prosternum, thickly covered with long black hair; 2nd abscissa of radius about one fourth longer than the 3rd; 1st recurrent nervure received shortly beyond, the 2nd shortly before middle of cellule. Antennæ as long as the head and thorax united; thick; the 1st and 2nd joints of flagellum about equal in length; the base of the middle joints slightly obliquely incised; the underside of the 6th to 9th projecting into a short spine. Occiput rounded, short, the malar space forming part of the segment of the circle. Malar space small. Hinder ocelli separated from the eyes by a slightly greater distance than they are from each other. Apex of clypeus broadly rounded. Eyes slightly converging below. Mandibles long, piceous at the apex; the apical tooth long, sharp, the subapical small. Median segment longer than its width at the apex; it has a flat, gradually rounded slope to the apex. Tibiæ and tarsi minutely spined; the 4 front claws bifid; the inner tooth shorter than the outer; the hind claw greatly more thickened, larger, curved and with 2 smaller teeth at the apex. Median segment transversely rugose, thickly covered with short black pubescence; 1st abdominal segment longer than 2nd; at base half the width of apex; it becomes gradually wider.

The 1st and 3rd transverse cubital nervures are obliquely bent in front; the transverse median nervure is received beyond the transverse median; the cubitus in hind wings originates beyond the transverse median; the long spur of hind calcaria reaches to middle of metatarsus.

This is not an *Anoplius* as now limited. Probably when the female is discovered it will be found to be the type of a new genus. In Ashmead's arrangement it comes near *Pompilinus*. The long hair on the head, the short, thick, peculiarly incised middle joints of antennæ and thick, sharply curved hind claws are 3 noteworthy characters.

*Pseudagenia longitarsis*, sp. nov.

Black, the antennæ, head, the prothorax (except for an elongated triangular mark on the pleuræ and the sternum which are black) the mesonotum and scutellum dark ferruginous; legs red, the 4 front coxæ broadly at the base and the hinder entirely black; the hind tarsi infuscated; wings uniformly dark fuscous-violaceous. Male.

Length 17 mm.

Third joint of antennæ nearly as long as the following 2 united; eyes distinctly converging above; ocelli almost in a triangle; the hinder separated from the eyes by double the distance they are from each other; temples broad, one-third the length of 3rd antennal joint; obliquely rounded. Clypeus distinctly roundly convex, its apex broadly rounded; metanotum with a gradually rounded slope; the base closely transversely striated; the apex alutaceous; there is no central furrow; 2nd abscissa of radius about one-fourth longer than the 4th; the 1st recurrent nervure received near the base of the apical third of the cellule; the 2nd in the middle; cubitus in hind wings received shortly behind transverse median; tarsi thickly spinose; claws with a short stout tooth in the middle; the tarsi very long; the basal 2 joints of hinder longer than the tibiæ. Comes close to *P. rostrata*, Grib.

*Pseudagenia robusta*, sp. nov.

Black; the apex of clypeus and labrum, mandibles, basal 6 joints of antennæ, femora and tibiæ dark red; wings uniformly dark fuscous-violaceous. Female.

Length 18 mm.

1st joint of flagellum as long as the scape and pedicle united and not much shorter than the 2nd and 3rd united, eyes on inner side slightly diverging below; ocelli in a curve, the hinder separated from each other by about the same distance they are from the eyes; temples short, roundly narrowed; apex of clypeus transverse; malar space minute; apex of mandibles broad, oblique; apex of pronotum broadly rounded, slightly angled in the middle; mesonotum flat at apex; base of scutellum transverse, raised; scutellums smooth and shining in the middle; median segment clearly longer than wide, opaque, alutaceous, obscurely transversely striated; the apical slope sharply striated, the striæ clearly separated; the base with a distinct, wide furrow down the middle; pleuræ opaque, mesopleural furrow with some keels; apex of metanotum with a straight, oblique slope; first segment of abdomen distinctly narrowed at the base; wings short; the apex of radius oblique, slightly rounded at the top; 2nd abscissa of radius about one-third longer than 2nd; 1st transverse cubital nervure broadly, the 2nd less broadly rounded; the 3rd obliquely bent at the top, transverse median nervure received dis-

tinctly beyond the transverse basal; cubitus in hind wing received before the transverse median; tarsi stoutly spined.

This species looks more like a *Salius* or *Anoplius* than a *Pseudagenia* or *Agenia*.

*Pseudagenia iridipennis*, sp. nov.

Length 13 mm.

This species is very similar to *P. robusta*; the two may be separated thus:—

Legs and antennæ black; median segment not furrowed; the cubitus in hind wings interstitial. Length 13 mm. (*iridipennis*). Legs and antennæ for the greater part dark red; metanotum distinctly furrowed; the cubitus nervure in hind wings received before transverse median. Length 18 mm. (*robusta*).

Entirely black, except the greater part of mandibles, and apex of clypeus; head and thorax opaque, abdomen shining; eyes slightly diverging below; malar space almost absent; ocelli in a curve, the hinder separated from each other by about the same distance they are from the eyes; temples obliquely roundly narrowed; apex of clypeus broadly rounded; median segment closely transversely striated, the striæ becoming coarser towards the apex, which is broadly rounded above and laterally. The segment is clearly longer than it is broad at the base; second abscissa of radius about one-third longer than the 3rd; the 1st and 3rd transverse cubital nervures are obliquely bent in front, the latter more sharply than the 1st; both the recurrent nervures are received beyond the middle; the 2nd farther than the 1st; cubitus in hind wing interstitial.

*Pseudagenia æthiopica*, sp. nov.

Reddish-orange, the mesonotum at the sides of the scutellums, median segment, pro- and mesopleuræ, the basal half of the 1st abdominal segment, and the ventral surface in the middle, black; legs coloured like the body, all the coxæ, black; wings hyaline slightly suffused with fuscous; the nervures and stigma black; antennæ coloured like the body. Male.

Length 10 mm.

Head sparsely covered with pale hairs. Eyes on the inner border clearly converging above. Ocelli in a black spot, which projects obliquely beyond them in front and is there incised in the middle; the hinder are separated from the eyes by a distinctly

greater distance than they are from each other. Clypeus roundly convex; its apex broadly rounded, the apex depressed, smooth. Mandibular teeth black. Temples roundly narrowed. Third antennæ joint as long as the vertex between the eyes and distinctly longer than the fourth. Palpi pale testaceous. Pronotum behind broadly incised; rounded; its sides broadly rounded. Metanotum alutaceous, covered with a silvery pubescence; indistinctly furrowed down the middle. The 2nd and 3rd abscissæ of the radius and cubitus equal in length, or almost so; the 1st recurrent nervure received shortly beyond the middle: the 2nd at the apex of the basal third of the cellule.

The metanotum is clearly longer than broad; the metapleuræ are obscurely striated. Abdomen shorter than the thorax; apex of penultimate ventral segment roundly incised. The long spur of the hinder calcaria does not quite reach to the middle of the metatarsus and is longer than the 2nd tarsal joint.

The form of colouration shown by this species is, apparently, common in Africa. The present species comes near to *P. nigro-aurantiaca*, Magr., from which it differs, *inter alia*, in the propleuræ and all the coxæ being black.

*Ceropales punctulata*, sp. nov.

Black; the lower part of the front including the lower half of the inner orbits, the outer orbits narrowly, face, clypeus, labrum, mandibles, under part of the scape and second joint of antennæ and the 4 front coxæ below, bright yellow; a broad line on the apex of the pronotum, the apical half of the 1st abdominal segment and the legs rufous; the flagellum of the antennæ bright rufo-testaceous; the scape black above; wings hyaline, the stigma fuscous in the middle, the rest and the nervures black. Male.

Length 8 mm.

Antennæ short and thick; the 3rd and 4th joints equal in length; front and vertex strongly punctured, the vertex behind less closely than the front; hind ocelli separated from the eyes by about the same distance they are from each other. Temples short, rounded. Eyes distinctly converging below; roundly incised; the malar space small. Apex of clypeus slightly roundly incised. Mesonotum strongly, but not closely punctured; the part bordering the furrows (which are distinct) smooth; the sides of the scutellum punctured, the centre smooth; its top marked with yellow in the centre. Median segment opaque, alutaceous; a V-shaped depression at the base in the middle; its centre is furrowed; its sides

have an oblique slope; the part on either side of it is irregularly, stoutly obliquely striated; the apical slope is straight, oblique. Propleuræ strongly punctured above in front; the mesopleuræ less strongly and more regularly punctured except at the apex below; metapleurae almost smooth. The 2nd abscissa of radius almost twice the length of the 3rd; the 3rd cellule in front about one third of what it is behind, it being in front the length of the space bounded by the 2nd recurrent and 2nd transverse cubital nervures; the upper part of the 1st transverse cubital nervure is obliquely bent; the 2nd is slightly, roundly bent towards the apex of the wing. Hind coxæ black, rufous below; the upper part on the outer side with a yellow line.

The genus *Ceropales* appears to be rare in Africa.

## SPHEGIDÆ.

*Trypoxylon foveatum*, sp. nov.

Black; the mandibles rufo-testaceous, palpi pale testaceous; calcaria white; wings hyaline, the anterior with a slight fuscous tinge and highly iridescent; the nervures and stigma black; frontal area large; broadly rounded behind and enclosing the front ocellus; its apex narrowed to a sharp point, the keels there slightly curved inwardly, head and thorax covered with longish white pubescence; abdominal petiole longer than the 2nd and 3rd segments united; last segment ending in a long, curved, stout spine Female.

Length 11 mm.

Eyes distinctly converging below. The frontal area is raised; its sides have an oblique slope outside the keel; inside it is depressed towards the centre where there is an impressed line. Eye incision and vertex obscurely punctured; the face and clypeus covered with silvery pubescence. Area on metanotum raised, depressed in the centre which is transversely striated; its raised sides rounded; the part at its apex depressed; the depression narrowed and rounded at the apex; the part at the sides of the area with a few irregular transverse striæ; the apical slope

irregularly transversely striated. Pro- meso- and base of metapleuræ smooth ; the rest of metapleuræ closely, finely obliquely striated, the top and bottom more strongly than the middle at the base. Pleural sutures irregularly striated ; there is a round fovea behind the middle of the mesopleuræ ; propleural depression wide and deep ; it is finely obliquely, but not closely, striated. Radial cellule elongated, as in *T. confratum*, Kohl. Malar space absent. From the angle of the frontal area where it commences to narrow, a not very distinct keel runs to the eyes ; the apex of the clypeus is depressed and bordered behind by a fine furrow ; cubitus at its junction with the transverse cubital nervure broadly rounded, not acute as in *T. confratum*. Comes near to *T. stroudi*, Grib.

## BETHYLIDÆ.

### *Tanynotus*, gen. nov.

Antennæ about 40-jointed, issuing from the front of the head, where they are widely separated and cover the mouth. Head flattened, longer than broad, the occiput roundly incised ; the eyes large, reaching near to the edge of the occiput, and in front, to near the base of the apical third of the head ; there are no ocelli. Thorax flattened above ; the prothorax nearly as long as the rest united ; it is of equal width throughout ; mesothorax small, wider than long ; the metathorax nearly three times the length of the meso-, it is roundly narrowed behind. Abdomen shorter than the thorax, and broader than it ; flat. Fore femora largely dilated, as long as the prothorax, ovate, broadest at the base ; the tibiæ are similarly dilated, broadest at the base ; the middle femora are not much dilated ; the hinder flat, roundly dilated above ; the tarsi are longer than the tibæ.

Belongs, except as regards the large number of joints in the antennæ, to the *Bethylinæ*. I am not certain about the exact number of joints, owing to the difficulty of counting them exactly. The parapsidal furrows are absent. The form of the mandibles I am unable to describe, owing to their being hid by the projecting front of the head. In the known apterous genera of *Bethylinæ*

there are no ocelli, and the eyes are always small; but here the eyes are fully larger than they are in the winged genera, than in *e.g. Bethylus*. The fore legs, too, are much more swollen than they are in any of the described genera.

*Tanynotus rufithorax*, sp. nov.

Black: the greater part of the antennæ, oral region and thorax red; the tibiæ and tarsi testaceous, smooth, shining, covered with a white microscopic pile; the pronotum and metanotum furrowed down the middle. Scape of antennæ thickened, as long as the following 2 joints united. Apical segments of abdomen dark testaceous. Antennæ as long as the thorax; head almost as long as the prothorax, behind distinctly wider than it. Antennæ as long as the thorax. Female.

Length nearly 5 mm.

## ICHNEUMONIDÆ.

*Ichneumon rubriornatus*, sp. nov.

Black; the flagellum of antennæ, petiole, and basal third of 2nd abdominal segment red; scape of antennæ, face, clypeus, mandibles, palpi, a line on the base of pronotum, tegulæ, tubercles, the scutellums, metanotum, except at the base, post-petiole, apical third of 2nd abdominal segment, less than the apical half of the 3rd, the band roundly narrowed in the middle, the apical two-thirds of the 6th segment and the whole of the 7th, bright yellow; legs yellow; the hind coxæ below, apex of hind femora, of the hind tibiæ more broadly and the apical joints of the hind tarsi, black; there is a rufous band in front of the black ring on the hind tibiæ; wings hyaline; the costa and stigma dark testaceous, the nervures darker. Male.

Length 12 mm.

Antennæ short and thick, distinctly narrowed towards the apex, in length hardly longer than the abdomen. Head and thorax thickly covered with short white pubescence; temples obliquely narrowed; front, vertex, face and clypeus closely strongly punctured; apex of clypeus transverse, the sides rounded; front

furrowed in the centre. Thorax closely, the metanotum more rugosely punctured; the keels on the metanotum not very strongly developed; the areola square, not clearly defined behind. The central part of the petiole and post-petiole raised; the latter coarsely punctured; the other segments are more closely and regularly punctured; gastrocoeli oblique, narrow, the part between them not striated. Areolet 5-angled; disco-cubital nervure broken by the stump of a nervure. Tarsi pilose beneath, the apices of the joints spinose.

*Eristicus iridipennis*, sp. nov.

Black, the eye-orbits narrowly, basal 3 segments of abdomen, the fore femora except at the base, the apex above, the apical half of the middle below, the hinder on the inner side, tibiæ and tarsi rufous; wings fuscous violaceous, the stigma and nervures black. Female.

Length 9 mm.

Antennæ brownish below on the apical half; the scape obscure rufous below. Head closely and distinctly punctured and covered with pale pubescence; the clypeus is more shining and less closely punctured. Thorax closely and strongly punctured; the median segment more coarsely than the rest; the scutellum shining, sparsely punctured. On the median segment the only distinct area is on the sides of the apical slope. Abdomen shining, the basal 3 segments minutely punctured; the 4th and following segments are obscure rufous at the apex; the last is broadly rounded; the ventral segments largely marked with rufous. Apices of tarsal joints and of tibiæ thickly spinose; the basal joint of tarsi thickly spinose below; the outer side of tibiæ sparsely spined.

The wings are highly iridescent; the areolet is large, 5-angled; mandibles rufous in the middle; metanotum obliquely depressed in the middle at the base; the sides bordered; the areola is only distinctly bordered at the base, and indistinctly laterally at the base.

*Cryptus capensis*, sp. nov.

Black; the abdomen, except at the base of the 1st segment, the femora, tibiæ, and tarsi, red; wings hyaline, with a fuscous-violaceous tinge, the nervures and stigma black. Female.

Length 13, terebra 4 mm.

Antennæ, with joints 6-8, white beneath; head opaque, closely punctured, the clypeus more shining and more widely punctured than the face, which is roundly dilated above in the centre; front deeply and widely depressed; the upper two-thirds with a stout longitudinal keel down the centre; the rest closely transversely striated; there is a brownish line on the middle of the inner orbits. Thorax closely rugose; the apex and the lower part of the propleuræ strongly striated; the metapleuræ more coarsely than the meso-, the punctuation running into reticulations; the apex of the meta- stoutly, irregularly, obliquely striated-reticulated. Scutellum more shining and less closely punctured than the mesonotum; its sides stoutly keeled to near the apex, which is irregularly striated. The part between the 2 metanotal keels is irregularly reticulated; the apex is more closely punctured-reticulated; the tooth on the sides of the basal carina is short, on the second it is stouter and more distinct; on the base of the segment, in the middle, is a small triangular area. Abdomen smooth and shining. There is a longish stump of a nervure on the disco-cubital; the recurrent nervure is received almost in the middle of the areolet; transverse basal nervure interstitial. The tarsi are darker coloured than the tibiæ and are closely spined. There is a distinct keel down the base of the propleuræ, extending from the top to the bottom; the clypeus is not separated from the face by a furrow; the labrum and mandibles above, in the middle, rufous; malar space as long as the antennal scape; the basal metanotal keel is sharply projected backward; the projection is sharply pointed and is united to the basal area; metanotal spiracles small, about 3 times longer than wide; the metapleuræ project into a small tooth at the apex below.

Allied to *C. muricatus*, Tosq.

*Mesostenus O'Neili*, sp. nov.

Rufous, the abdomen of a darker red, its apical 5 segments white, the breast and lower part of metapleuræ black, legs black, suffused with white; the anterior and the middle tibiæ in front white; wings clear hyaline; the nervures and stigma black. Female.

Length 10, terebra 4 mm.

Front below the ocelli irregularly reticulated, keeled down the centre. Face broadly, roundly projecting in the centre, not

separated from the face by a furrow, irregularly punctured, the sides less strongly punctured, the centre of the clypeus with distinct punctures, the sides almost smooth. Mandibles for the greater part black, a yellow spot at the base above; the teeth equal in length. Palpi yellowish. Mesonotum closely punctured, the outer sides of the middle lobe and the inner and outer sides of the lateral closely, finely transversely striated. Scutellum sparsely punctured on the basal, the apical closely punctured; the keels for the greater part yellow. The base of metanotum closely, irregularly finely reticulated; the rest much more strongly and closely reticulated, the apical slope more regularly than the rest. Propleuræ closely punctured and striated above, the lower part, in the middle, stoutly striated; the meso- and meta- closely reticulated and punctured, the latter more strongly than the former. Basal 3 abdominal segments closely rugosely punctured; the postpetiole more coarsely than the rest. Tarsi dark testaceous.

The 2 transverse keels on the metanotum are interrupted in the middle; the areolet minute, square, the basal nervure thick, the apical thin; the transverse median nervure is received distinctly behind the transverse basal; tegulæ rufous; temples small, obliquely narrowed; labrum white; the transverse median nervure in hind wings is broken far below the middle.

Comes close to *M. vulpis*, Tosq.

*Larpelites*, gen. nov.

Front depressed, a keel, projecting into a spine, at its apex, in the centre. Apex of clypeus depressed, its top indistinctly separated from the face. Thorax more than three times longer than wide. Parapsidal furrows distinct for two-thirds of the length of mesonotum. Scutellum roundly raised, its sides distinctly keeled to beyond the middle. Metanotum with 2 transverse keels, the sides spined. Areolet moderately large, narrowed at the base, the recurrent nervure received near the apex; transverse median nervure received shortly behind the transverse basal; transverse median nervure in hind wings angularly broken shortly below the middle. Front tarsi about twice the length of tibiæ; claws small. Abdominal petiole long and slender, gradually widened to the apex. Metapleural keel reaching to the hind coxæ.

The eyes do not reach to the base of the clypeus, the malar space being therefore large; the temples large, obliquely narrowed;

there is an area on the centre of metanotum at the base : the metathoracic spiracles small, longish oval ; there are no thyridia ; there is an oblique keel on the propleuræ : there are 8 dorsal abdominal segments ; there are no distinct cerci. Mandibles bidentate.

Comes nearest to *Listrognathus* To this genus probably belongs *Mesostenus striatifrons*, Brullé, from the Cape of Good Hope.

*Larpelites ruficollis*, sp. nov.

Black, the prothorax, mesonotum with scutellums, the mesopleuræ from shortly below the middle, red ; a band on the upper side of the middle of antennæ, a narrow line on the apex of the penultimate and on the last segment above, white ; legs black, the 4 anterior femora and tibiæ dull testaceous in front ; wings hyaline, the apex infuscated, the nervures and stigma black. Female.

Length 10 mm. ; terebra 4 mm.

The ocellar region and the upper part of the front bearing large, round, clearly separated punctures ; the frontal spine in front becomes gradually lengthened to the apex, which is sharply pointed. Face and upper part of clypeus closely and distinctly punctured, the punctures in the centre almost forming reticulations ; the depressed apex of the clypeus and the labrum smooth and shining. Mandibles opaque and punctured at the base, the rest smooth and shining. Palpi dark testaceous. Pro- and mesothorax closely and strongly punctured ; the base of the metanotum is similarly, the rest of it more strongly rugosely, punctured. Scutellar keels stout, extending to the middle. Post scutellum smooth and shining. Abdomen smooth, the apical segments more shining.

*Pimpla shawi*, sp. nov.

Black, the face, clypeus, the lower half of outer orbits, mandibles to near the teeth and 4 front legs, yellowish-fulvous ; wings yellowish-hyaline, the apex from the base of the stigma fuscous, with a large yellowish-hyaline cloud extending from the apex of the stigma to near the middle of the apical abscissa of radius and extending to shortly beyond the sub-discoidal nervure, where it becomes obliquely narrowed, and touching the outer side of the apex of the recurrent nervure ; the apex of the hind wings fuscous.

The stigmal cloud has the anterior half narrower than the posterior and is irregularly narrowed in the centre. Female.

Length 12 mm.: terebra 11 mm.

Hab. Grahamstown.

Antennæ black: head smooth and shining; the temples rounded, not obliquely narrowed; face blackish in the centre above; it is separated from the face by a distinct transverse furrow, which has a fovea on either side of the middle; clypeus semicircularly depressed in the middle; its centre roundly incised, the sides roundly lobed. Thorax smooth and shining; the parapsidal furrows distinct at the base only; the sides of the median segment sparsely punctured; abdominal segments closely, strongly punctured, the 1st not so closely as the others and the apical less strongly; the apices of all the segments are smooth and shining. The upper half of the metapleuræ sparsely punctured. Wings large; the areolet oblique; the nervures unite in front; the recurrent nervure is roundly curved, and is received near the base of the apical third; the disco-cubital nervure is broken by a large stump of a nervure. Tegulæ luteous Tarsi covered with stiff pubescence, which is fulvous on the hind pair; the apices of the joints spinose; the hinder calcaria pale.

Comes near to *P. crocata*, Tosq. The species is named after my old schoolmaster, Dr. John Shaw of Colesberg.

*Pimpla spiloaspis*, sp. nov.

Black; the abdomen and legs ferruginous; a broad band on the pronotum, tegulæ, scutellum from near the base, the mark roundly narrowed there, post-scutellum, and a mark, longer than broad, on either side of the apex of metanotum, white. Wings clear hyaline, the nervures and stigma black, the areolet narrowed in front, the nervures uniting there, recurrent nervure received shortly beyond the middle; transverse median nervure almost interstitial; transverse median nervure in hind wing broken about halfway between the middle and top. Female and Male.

Length 9-10, terebra 3 mm.

Face closely and strongly punctured; clypeus smooth, its lower part rufo-testaceous. Mandibles closely punctured, the teeth smooth. Palpi black. Pro- and mesothorax closely and uniformly punctured; metanotum closely transversely, finely striated, the striæ more or less curved; the punctuation on the

metapleuræ is closer and finer than on the mesopleuræ. All the coxæ are black ; the hind femora are of a darker red ; the hind tibiæ and tarsi are blackish. Abdomen closely and distinctly punctured, except the base of the 1st segment which is smooth and bears 2 small shining tubercles above ; the depressions on the back are indistinct.

Male distinctly coloured ; the fore tibiæ and tarsi are white in front ; the 4 front femora have a white mark on the apex in front, their tibiæ and tarsi blackish.

*Lissonota curvilineata*, sp. nov.

Black; the face, except for a black line in the middle, clypeus, mandibles, except at apex, eye orbits (the inner more broadly than outer), the greater part of prothorax, a U-shaped mark, dilated laterally at the base, on the basal two-thirds of the mesonotum ; 2 longish lines on the sites of the scutellum, extending shortly beyond the middle, a narrow transverse one on its apex, a similar line on the post-scutellum, the apex of the metanotum, the mark dilated backwards in the middle, tegulæ, tubercles and a curved line on the lower part of the mesopleuræ, pale yellow. Legs rufous, the front coxæ and trochanters, the middle trochanters below, middle coxæ and the base of all the tibiæ narrowly, pale yellow. The sides of the 1st abdominal segment at the base, its apex and the apices of the 2nd to 4th narrowly, yellow. Wings hyaline, the apex smoky ; areolet with the pedicle as long as the lower branches, which are roundly curved. Head and thorax closely punctured, the thorax much more strongly than the head and the median segment than the mesothorax. Abdomen smooth. The hind tibiæ and tarsi blackish.

*Lissonota africana*, sp. nov.

Rufous ; the head yellow, its occiput rufous, the vertex and front broadly black in the middle, a rufous line, dilated gradually to the apex, on the centre of face and top of clypeus, darker at the apex ; labrum dull rufous. Antennæ black, the scape dull below. On the mesonotum are two lines, expanded outwardly at the base and reaching near to the scutellum, which is yellow, with a rufous line on its basal two-thirds ; post-scutellum, a line on the apical two-thirds of the metanotum in the centre, united to a broader transverse one on the apex, the greater part of the pronotum, tegulæ, tubercles, a broad band below them, which is continued

obliquely on the lowerside to the apex of the mesopleuræ, where it is narrowed below at the apex, a mark below the hind wing and a mark, longer than broad, and narrowest behind, on the apex of the metapleuræ, and the apices of the basal 4 abdominal segments narrowly, yellow. Legs coloured like the body, the fore coxæ and trochanters, the greater part of the outerside and the apex below of the middle coxæ, yellow. Wings clear hyaline, the apex smoky; pedicle of areolet about twice the length of the inner lower nervure. Sutures of thorax black; the parts at the base and sides of scutellum, a transverse mark on the apex of the metanotum in the centre; the apex of the pro- and base of mesopleuræ, the top of the latter more broadly, the line dilated downwards near the apex, the pleural and sternal sutures, black. Head and thorax closely and distinctly punctured. The transverse median nervure is received very shortly beyond the transverse basal, almost interstitial. The metathorax is more strongly punctured than the rest of the thorax; the hind tarsi are black. Mandibles black, the base broadly white. The amount of black and yellow on the head and thorax probably varies.

*Metopius erythropus*, sp. nov.

Black; the head, except the occiput, yellow, suffused with red; the edge of the pronotum broadly, a large mark, rounded behind and below on the base of the mesopleuræ, scutellum, its keels, the sides of the apical slope of the metanotum and the apex of the metapleuræ, red, as are also the sides and apex of the 1st abdominal segment, and the two apical entirely; the apices of the 2nd, 3rd, 4th, and 5th segments yellow, the lines narrowed in the middle; legs red, the front coxæ black; wings hyaline, the apical half of the radial cellule and the whole of the 3rd cubital fuscous-violaceous. Female.

Length 12 mm.

Clypeus closely punctured, its tops and sides depressed, its apex broadly rounded; labrum pale yellow, smooth. Mandibles red, black at apex. Palpi red. Thorax closely punctured; a smooth shining spot on the sides of the metanotum and on the upper part of the apex of the mesopleuræ. Scutellum sparsely punctured, the punctures large; its lateral keels large, roundly curved, largely projecting beyond the central part of the apex, which is almost transverse. Post-scutellum closely punctured. On the centre of the metanotum are two curved keels; on the apical slope are two straight, less widely separated, keels; on either side

of the basal area is a smooth depression, rounded at the apex. Pleuræ and sternum covered with white pubescence; the red apex of metapleuræ striated; the lower part of the meso- is furrowed. First segment of abdomen with large, widely separated punctures; the base with 2 widely separated keels; the sides at the apex smooth; the other segments are closely, strongly and regularly punctured; the punctuation being weaker gradually to the apical. The large rhomboidal areolet is shortly appendiculated and receives the recurrent nervure shortly behind the middle; the stigma pale testaceous; the transverse median nervure is received shortly in front of the transverse basal; tegulæ red; the transverse median nervure in hind wings broken above the middle. Basal joints of antennæ red; the rest are broken off. First, second, third, fourth and sixth segments are longer than broad; the 5th almost square.

This is a *Metopius s. str.*

## BRACONIDÆ.

*Iphiaulax capensis*, sp. nov.

Rufo-testaceous, the front, vertex, occiput, upper half of outer eye orbits and antennæ, black; palpi blackish, thickly covered with long white hair; apex of mandibles black; there is a short black line on the top of the face in the centre, wings dark fuscous; the basal two-thirds of stigma ochraceous; a curved, oblique hyaline cloud, narrowed below in the 1st cubital cellule, extending below into the discoidal cellule; and there is a small hyaline cloud on either side of the 2nd transverse cubital nervure, the larger cloud on the outerside. Female.

Length 14-15, terebra 20 mm.

Antennae stout, shorter than the body; the scape about 4 times longer than wide, shining, sparsely covered with black hair; the 3rd and 4th joints equal in length. Face coarsely rugosely punctured, sparsely covered with black hair; the clypeus smooth. Front deeply depressed, its sides raised; the centre with a deep furrow; the orbits lined with luteous to near the top of the eyes.

Temples broad, rounded behind. Thorax smooth and shining; the furrows fine. Abdomen nearly twice the length of the thorax. First segment of abdomen about one fourth longer than broad at the apex, smooth, the apex irregularly striated; 2nd, 3rd, and 4th segments with their furrows closely longitudinally striated; the area on 2nd segment is large, slightly longer than broad, rounded broadly at the apex and irregularly striated; it is surrounded by a broad striated belt, the striæ on the sides being oblique, and on the outer side bounded by a smooth keel; the lateral depression is almost smooth at the base, it apex obliquely striated. Apical abscissa of radius about equal in length to the basal two united; recurrent nervure received in the apex of the 1st cubital cellule. Tarsi darker coloured than the rest of the legs; pilose below; the apices of the joints spinose.

*Iphiaulax basimacula*, sp. nov.

Black, the abdomen, except for a square mark in the centre of its 1st segment, red; wings uniformly dark fuscous, the base of the stigma pale orange. Female.

Length 8, terebra 3 mm.

Antennæ longer than the body; the scape thickly covered with stiff black hair, of equal width, about 3 times longer than wide; 2nd joint minute, narrowed, red; the 3rd slightly longer than the 4th. Face thickly covered with long black hair, smooth; clypeus, small; oral opening large, almost transverse in the middle above; the malar space moderately large, as long as the 3rd antennal joint; it has a large rufous mark. Palpi black, covered with long white hair. Thorax smooth and shining; scutellum roundly convex; middle lobe of mesonotum slightly raised; parapsidal furrows indicated as fine lines. 3rd abscissa of radius longer than the 1st and 2nd united; the 1st abscissa of cubitus straight, oblique. Abdomen broad, ovate, as long as the head and thorax united; 1st segment as long as its width at the apex, its central part closely, finely longitudinally striated; the depressed sides irregularly obliquely striated; 2nd to 5th segments closely rugosely punctured and irregularly striated; the 3 transverse furrows are wide and deep, closely, strongly striated; there is no area on the base of 2nd segment; its sides at the base are largely depressed; the sides of the 5th are roundly dilated at the apex.

The eyes are not so large as usual; temples wide, slightly obliquely narrowed; occiput transverse; fore tibiæ as long as the

basal 3 joints of tarsi. There is a pale narrow cloud in the 1st cubital cellule, and a wider, shorter one beyond it in the discoidal cellule. Front with a deep, opaque furrow extending from the antennæ to near the apex.

Allied to *I. natalensis*, Szép.

*Iphiaulax clanes*, sp. nov.

Ferruginous; the front half of vertex, the posterior part of front, the band roundly dilated in the middle, the antennæ and apex of mandibles, black; wings light fuscous, the 1st cubital cellule almost hyaline; the basal two-thirds of the stigma pale ochraceous; the costa and nervures black. Female.

Length 6, terebra 1 mm.

Face covered with white pubescence, irregularly wrinkled. Scape of antennæ covered with white hair, shining, about 3 times longer than broad, narrowed towards the base; 3rd joint narrowed at the base, slightly longer than the 4th. Abdomen broadly oval, fully longer than the head and thorax united; the raised central part coarsely, irregularly, longitudinally striated, with finer, irregular transverse striae; its sides depressed, almost smooth, pale yellow and bordered outwardly, the keel with an oblique, straight slope at the base and tuberculated outwards above; the sides, outside this, are depressed, pale yellow, broad at the apex. The central part of the 2nd segment is square, bounded laterally by a straight keel; the basal area is large, longer than broad, obliquely narrowed at the apex, smooth and shining; the sides are closely striated, the striæ more curved and clearly separated at the base than at the apex; the 3rd, 4th and 5th segments are closely, longitudinally striated, the apices of the segments smooth; transverse furrows wide, deep and closely striated. Apical segments smooth, pale yellow. The 3rd abscissa of radius as long as the basal 2 united; the recurrent nervure received in apex of 1st cubital cellule.

*Iphiaulax rubrilineatus*, sp. nov.

Black; the lower part of the face on the sides, oral region, malar space on the sides and apex rufo-testaceous; thorax rufous; 2 narrow lines on the 2nd abdominal segment, bordering the area and extending from the base to the apex, suturiform articulation, except in the centre; the following 2 furrows in the centre, a

band down the centre of the 3rd and 4th segments and the base of the 5th in the centre, rufous. Wings dark fuscous; the stigma, except at the base, ochraceous; a hyaline cloud in the 1st cubital cellule, extended into the discoidal cellule, and one on either side of the base of the radial nervure in the hind wings. Female.

Length 18, terebra 22 mm.

Antennæ shorter than the body, stout; the scape about 4 times longer than wide, thickly covered with long black hair. Face coarsely, rugosely punctured, sparsely covered with long black hair. Mesonotum flat behind. The apex of the 1st, 2nd, 3rd and 4th abdominal segments closely, longitudinally striated; the area on the 2nd segment is large, closely longitudinally striated, and becomes gradually narrowed to a sharp point; its bordering depressions are stoutly obliquely striated; the lateral apical depressions are obliquely striated. The 3rd abscissa of radius is nearly as long as the basal 2 united; the recurrent nervure is received in the apex of the 1st cubital cellule. Basal two joints of fore tarsi as long as the tibiæ.

*Iphiaulax rubrinervis*, sp. nov.

Vermilion-red: antennæ, the front and vertex, except along the orbits narrowly, occiput, a broad mark on the centre of mesonotum, extending from its base to the middle, a longer, narrower one on the sides extending from near the base to the apex, an obscure mark on the base of scutellum a mark, longer than broad, on either side of the centre of the base of metanotum, followed by a thinner one of the same length on the outer side of the apex, prosternum, mesosternum, a broad line on the centre of mesopleuræ, on the apical two-thirds, a mark, longer than broad, on the apex above it, and a somewhat pyriform mark near the apex below it, black. Wings fuscous; the base to the transverse basal nervure fuscous-hyaline, the 1st cubital cellule and a cloud in front of the recurrent nervure, extending to the opposite side of the wings, hyaline; and the basal two-thirds of the hind wings are greyish in front; the costa and stigma and the basal half of the costal nervure in the hind wings are rufous. Legs coloured like the body; the hinder tarsi from the apex of the 1st joint blackish. Female.

Length 13 mm.

Antennæ longer than the body, its scape fully twice longer

than broad. Head smooth and shining, the face thickly covered with long white hair; temples broad, slightly, roundly obliquely narrowed; front with an oblique slope, furrowed in the centre; tips of mandibles black; palpi pale red, thickly covered with white hair. Thorax smooth and shining; the pleuræ, breast and metanotum thickly covered with white hair. Abdomen distinctly broader than the thorax, as long as it and the head united; the raised central part of the 1st segment with 4 stout longitudinal striæ; the depressed lateral part smooth, wide; the 2nd to 5th segments are coarsely, closely rugosely punctured, their furrows deep and crenulated, wider and curved at the sides; there is no area on the base of 2nd segment, which is irregularly longitudinally striated; the 3rd to 5th are smooth laterally at the base; the 5th has the apex produced at the sides. The 3rd abscissa of the radius is longer than the basal two united; the 2nd transverse cubital nervure is bordered by a narrow hyaline cloud; the basal lobe of mesonotum is hardly raised; the scape of antennæ is produced into a short, sharp tooth at the apex below.

My only example wants the ovipositor. The species is related to *I. pictus*, Bé, and *I. incisus*, Bé.

*Iphiaulax æthiopicus, sp. nov.*

Black; oral region, mandibles, the greater part of malar space, apical half of fore femora, tibiæ and tarsi, yellow; wings yellowish-hyaline, the apices of both fuscous, the anterior from the apex of the stigma, the stigma and nervures yellow. Female.

Length 13, terebra 24 mm.

Front and vertex smooth and shining; the former deeply furrowed down the middle; face rugosely punctured, irregularly reticulated; the sides bordered by a keel. Clypeus depressed in the middle, flat, the sides raised. Palpi rufo-testaceous, thickly covered with white hair; the apical joint of maxillary black. Thorax smooth and shining; the mesonotum flat. Abdomen twice the length of the head and thorax united; the basal 4 segments closely, coarsely longitudinally striated; the 2 basal longer than wide; the 3rd and 4th almost square; the basal half of 1st roundly convex; the 2nd with a longish, almost smooth depression on the sides near the apex; the 4th with a less distinct depression. There is no area on the base of the 2nd segment; on its base is a small smooth space, dilated obliquely in the middle.

Legs and antennæ thickly covered with stiff black pubescence; the middle lobe of mesonotum raised, but the furrows not distinctly defined throughout; calcaria and tarsal spines testaceous: the recurrent nervure is not quite interstitial; the 3rd abscissa of radius slightly shorter than 2nd.

*Iphiaulax odontoscapus*, sp. nov.

Length 10, terebra 5 mm.

This species agrees in colouration with *I. æthiopicus*, but is much smaller; its ovipositor is only half the length of the body; the striation on the basal 4 abdominal segments is finer and closer, the oral region, front legs, and palpi are entirely black, the 2nd abdominal segment is broader than long, as are also the 3rd and 4th, not longer than broad; the abdomen is shorter compared with the thorax; its middle is distinctly broader than the thorax, and more distinctly narrowed towards the base and apex; there is no area on the base of the 2nd segment; the apical cloud in the fore wings is of the same size, but is straight, not dilated backwards in the middle as in the larger species; the face is less strongly rugosely punctured, and the apex of the scape of antennæ projects into a distinct stout spine.

This species appears to be closely related to *I. luctuosus*, Bé. but it may be known from it by the 2nd abdominal segment, not having a smooth triangular plate at the base.

*Iphiaulax 12-fasciatus*, sp. nov.

Rufous; the antennæ, head, pronotum, mesonotum with scutellum, the lower part of propleurae and mesopleurae largely from close to the bottom, black; wings fuscous, a large hyaline cloud in the centre of the costal and median cellules, an irregular one extending from the stigma to the opposite side of the wing, where it is narrowed, a small one at the outerside of the 2nd transverse cubital nervure, a cloud at the base of the hind wings, a larger oblique behind, and a wider, more oblique one beyond the middle; the stigma yellow at the base. Female.

Length 12, terebra 17 mm.

Front and vertex smooth. the middle of front deeply depressed, flat, the centre furrowed; the sides broadly, roundly raised; face rugose, irregularly reticulated, its sides depressed; the oral region and mandibles, except at apex, rufous; palpi covered with white hair, rufous, black at base. Face sparsely covered with long white

hair. Thorax smooth and shining; the mesonotum flat, its apex flat and transverse; there is a narrow furrow in the centre of the metanotum. Basal 2 segments of abdomen longer than broad; the area on the 2nd segment triangular, its greatest length more than its width at the base; it is sharply pointed, smooth, except for a few irregular striæ in the centre; it is surrounded by a broad border of stout striæ; the lateral part has a triangular band of oblique, irregular striæ at the apex. Suturiform articu ation broad, deep, stoutly striated, beyond it the segment is irregularly longitudinally striated; the 3rd segment is closely, irregularly striated, except at the sides and apex; the 4th has a broad striated band in the middle, the sides at the base and the apex being smooth. Recurrent nervure received distinctly behind the transverse cubital. Temples large, not obliquely narrowed, broadly rounded behind. Thorax as long as the basal 3 abdominal segments, the abdomen being longish and of the width of the thorax. Legs slender; the front tarsi twice the length of the tibiæ.

*Iphiaulax bicolor*, Bé.

Mr. O'Neil sends from Dunbrody a species which appears to be the *Bracon bicolor*, Bé. It agrees with the description, except that it has got the hind tibiæ from near the base and the hind tarsi black, while from the description these are coloured like the rest of the legs. In the figure, however, (pl. 43, f. 3) these are certainly shown darker coloured than the rest of the legs.

*Acanthobracon nigromaculata*, sp. nov.

Ferruginous; the centre of vertex broadly, the mark slightly narrowed behind,—the mark continued to the antennæ, from which it is expanded to the eyes, mandibles, antennæ, the greater part of the pronotum, a mark on the sides of middle lobe of mesonotum, a larger, broader one on the basal two-thirds of lateral lobes and a mark behind the upper part of the eyes, black; wings fuscous, the costal cellule, the 1st cubital cellule and the part below it, almost hyaline; the nervures and stigma black. Female.

Length 11, terebra 5 mm.

Front and vertex smooth and shining; front depressed; the anterior ocellus in the depression; in its centre is a keel which becomes higher, almost spinose at the apex. Face irregularly punctured, almost rugose; the clypeus finely rugose, raised, clearly separated, rounded above. Pro- and mesothorax; propleural

furrow irregularly striated; mesopleural furrow smooth; metanotum, except the apex laterally, closely reticulated and with a keel down the centre; metapleuræ irregularly rugose at the base. First abdominal segment closely, distinctly punctured, its sides at the base and apex smooth; the sides with some irregular striæ; 2nd segment closely longitudinally striated; suturiform articulation roundly curved; at the sides is a curved furrow, which is broad and striated at the base, at the apex it is produced laterally, the whole forming a broadly oval area; its apex is smooth, as are also the apices of the following 2 segments their base being closely striated. The whole abdomen is thickly covered with short white pubescence. The upper spine on the hind coxæ is curved, thin, reaching shortly beyond the middle of the 1st abdominal segment; the lower one is about half its length and thicker and straighter. Palpi fuscous. The 3rd abscissa of radius is twice the length of the 1st and 2nd united; the 1st is very short; the transverse cubital nervures are straight and parallel.

Basal joints of antennæ thickly covered with short stiff black pile, the 3rd joint longer than the 1st; temples wide, rounded, tarsi spinose; base of fore femora distinctly narrowed; the part of the thorax in front of the tegulæ is as long as that behind.

*Exothecus tibialis*, sp nov.

Luteous, the 3rd and following segments of the abdomen, antennæ and hind tibiæ, calcaria and tarsi, black; wings fuscous, the base to near the transverse median nervure, the fore half of 1st cubital cellule, a small one below the 1st transverse cubital nervure and one on either side of the 2nd, and the hind wings to near the middle, yellow. Female.

Length 15, terebra 10 mm.

Smooth and shining; the head, pleuræ and metanotum thickly covered with longish pale pubescence; apex of clypeus obliquely depressed; mandibles black at apex; the front hollowed, furrowed in the middle, the sides of the furrow raised; mesonotum not lobed; the 1st abdominal segment longer than 2nd, about 3 times longer than wide; the middle broadly roundly convex, its sides furrowed; the 2nd with an area which reaches to the base of the apical third, which is distinctly narrowed and with the segment depressed on either side.

*Megalommum flavomaculatum*, sp. nov.

Testaceous ; antennæ, mesonotum, except for a yellow mark, with straight base and sides on the apical two-thirds, scutellum, middle of metanotum, lower part of propleuræ, mesopleuræ, except for a triangular yellow mark below the tegulæ, mesosternum and the greater part of metapleuræ, black. Wings hyaline to near the stigma, where there is an irregular cloud on both sides of the transverse basal nervure ; a fuscous mark in the centre of the 2nd discoidal cellule, one beyond it and the apex from the commencement of the radius ; nervures and stigma yellow ; the parastigma, apex and base of stigma black.

Length 9, terebra 3 mm.

Face coriaceous ; the rest smooth and shining ; the vertex more of a paler yellow colour than the face ; tips of mandibles black. Malar space as long as the pedicle of antennæ. Eyes large, distinctly incised on the inner side opposite the antennæ. Temples roundly narrowed, short. Abdomen smooth, as long as the head and thorax united ; 1st segment nearly as long as the 2nd and 3rd united ; it becomes gradually wider to the apex ; the plate on the 2nd segment is large, triangular, its apex produced to near the apex ; the parts surrounding it are depressed and striated stoutly ; suturiform articulation crenulated; it is the only furrow. Wings long ; the radius is curved downwards at the base and upwards at the apex ; the apical abscissa is longer than the basal two united ; 2nd discoidal cellule large, longer than wide, transverse at base, rounded at apex ; the cubitus is roundly curved at the base ; the recurrent nervure is received in the apex of the 1st cubital cellule.

*Xanthomicrodus*, gen. nov.

Inner spur of hind tibiæ reaching beyond middle of metatarsus. First cubital and discoidal cellules confluent ; areolet triangular, the basal nervure straight, oblique, the outer roundly curved, and without a stump of a nervure ; subdiscoidal nervure in hind wings originating at the middle of discoidal nervure, where there is a completely closed basal cellule ; this, with the praebrachial nervure, being the only transverse nervure ; the radius and cubitus extend to the apex of the wing ; the transverse basal and anal nervure in fore wings interstitial. Parapsidal furrows distinct; uniting at the apex of mesonotum. Scutellums keeled laterally. Median segment regularly areolated. Claws simple. Malar space moderately large ; apical tooth of mandibles

sharply pointed. Occiput margined; mesopleural tubercles large, bordered below by a stout keel; the furrow is smooth, wide, shallow. Abdomen smooth and shining; the 1st segment as long as the 2nd and 3rd united. Ocelli large. Palpi normal.

Comes near to *Crassomicrodus*.

*Xanthomicrodus iridipennis*, sp. nov.

Luteous, antennæ black, wings hyaline, highly iridescent, the costa and stigma black, the nervures testaceous. Male.

Length 7 mm.

Antennæ longer than the body, the scape covered sparsely with long pale hair; the flagellum densely with stiff black pubescence. Face punctured, thickly covered with white pubescence; an oblique furrow runs from between the ocelli. Mesonotum closely punctured; the furrows deep, smooth; the pubescence thick, fuscous. Post-scutellum with a furrow down the middle. The central basal area of metanotum is clearly defined, longish, its base sharply pointed, reaching to the apex of the basal depression; its apex transverse reaching to the top of basal slope; there are 2 areæ on its sides, the lower sharply pointed on the outer side; there are 5 large areæ on the apical slope; the spiracular area is large, clearly defined. Legs thickly covered with pale pubescence.

*Microdus bipustulatus*, sp. nov.

Black, shining; pro- and mesothorax and 4 front legs rufous; the clypeal, foveæ, palpi and mandibles, except at the apex, of a duller red; wings uniformly fuscous-violaceous, with black nervures and stigma. Male.

Length 11 mm.

Face and clypeus closely and somewhat strongly punctured; thickly covered with black pubescence; a curved furrow with a raised border on its outer side, runs from the hinder ocelli. Middle lobe of mesonotum largely raised. Scutellum with a keel on the base and apex; the apical higher and more curved than the basal. Post-scutellum depressed, its sides bordered, and there is a keel in the middle. Metanotum obliquely, deeply depressed at the base; the basal central area is wider than long, transverse at the apex, the base slightly, obliquely dilated at the middle; it is

bordered by a longer, narrow area, which, at the apex, extends beyond it; the apical slope forms one area, which is squarely narrowed at the base to the size of the basal one. Pleuræ smooth; there are 6 depressions, bordered by stout keels on the lower side of the meso-; the penultimate is as long as the preceding 2 united. Legs densely pilose; the areolet is almost square; the stump of a nervure on the 2nd transverse cubital is at the base.

## EVANIIDÆ.

*Gasteruption dunbrodyense*, sp. nov.

Rufo-ferruginous; the front, greater part of vertex, greater part of thorax above, a large triangular mark (the narrowed part below) on the base of mesopleuræ, the greater part of their apex below, the metapleuræ, except narrowly at the base and apex, metanotum, greater part of metapleuræ and the apical segments of the abdomen above, black. Legs similarly coloured; the hind tibiæ broadly white at the base below. Wings clear hyaline. Antennæ dark rufous, the basal 4 joints black. Female.

Length 13, terebra 14 mm.

Antennæ short, stout; the 3rd joint as long as the scape and pedicle united; the 4th slightly longer than the 3rd. Malar space as long as the pedicle of antennæ; the middle of clypeus separated from the face by a distinct furrow. Temples long, roundly narrowed to the vertex, which is almost transverse. Pronotum longer than its width at the apex. Mesothorax irregularly rugose, its base rounded; the apical depression of mesopleuræ striated, except above the middle; metanotum irregularly transversely reticulated, its centre with a raised longitudinal line. The whole thorax is thickly covered with silvery pubescence. The 4 anterior tibiæ and tarsi are white in front. Hind coxæ smooth. Hind ocelli separated by the length of antennal scape. Hind ocelli placed distinctly behind the eyes.

Comes near to *G. punctulatum*; that species may be separated by the hind ocelli being placed in front of the hinder edge of the eyes, by the shorter temples and shorter 3rd joint of antennæ.

## CYNIPIDIÆ.

### *Anacharoides*, gen nov.

Scutellum large, obliquely raised from the base to the apex : on the apical three-fourths is a depression, rounded behind, bordered by a distinct keel, the apex with a semi-circular depression, the basal foveæ large, separated from the mesonotum by a transverse keel ; parapsidal furrows distinct, except at the apex. Postscutellum with a triangular area—the narrow part at the base—in the centre, the keels bounding it smooth and shining. Metanotum with 2 widely separated keels in the centre. Abdominal petiole as long as the hind coxæ. Radial cellule open at fore margin and at the base ; the basal abscissa of radius broadly rounded, not clearly separated from the subcostal nervure. Temples sharply margined, striated.

The peculiar shape of the scutellum forms a well-marked feature with this genus of *Anacharinæ*.

### *Anacharoides striaticeps*, sp. nov.

Black ; the head for the greater part piceous ; the antennæ yellowish-testaceous ; the vertex finely rugose, bordered by a keel which runs from the anterior ocellus. Pronotum large, dark rufous ; propleuræ closely, minutely, indistinctly, obliquely striated. There is an oblique furrow on the mesopleuræ, running from the hind wings to the lower base of the wing ; the part above this and the metapleuræ rugosely punctured. Median segment alutaceous, covered with a white pubescence. Legs black, the joints piceous ; the 4 front tarsi testaceous. Wings clear hyaline, the nervures pale testaceous-yellow ; the margins of both wings shortly ciliated. Female.

Length 3 mm.

Pearston, South Africa. Prof. Robert Broom, C.M.Z.S.

Temples narrowed above, stoutly, closely striated, except close to the eyes ; occiput striated closely, the striæ curved.

# On the Hymenoptera of the Albany Museum, Grahamstown, South Africa.

By P. CAMERON.

FIRST PAPER.

Dr. Schönland, the Director of the Albany Museum, Grahamstown, South Africa, having sent me the *Hymenoptera* contained in the Museum under his charge for the purpose of examination and description, I intend in this series of papers to describe the new genera and species.

## THYNNIDÆ.

### *Odontothynnus*, gen. nov.

Apex of clypeus bidentate. Eyes slightly incised on inner side, reaching to the base of mandibles, which are stoutly bidentate. Temples long. Occiput broadly rounded. Antennæ stout, as long as the thorax; the 3rd joint shorter than the 4th. Radial cellule long; there are 4 cubital cellules; the 1st transverse cubital nervure broken below the middle by the stump of a nervure; transverse median nervure received shortly behind the transverse basal; transverse cubital nervure in hind wings broken above the middle. Legs short and stout; hind claws simple; the fore cleft; hind tibiæ serrate. Abdomen sessile, flattish, broad above; pygidium bluntly rounded; the hypopygium projecting beyond it, its apex bluntly rounded.

The maxillary palpi are 6; the labial 4-jointed; the pronotum in the centre is as long as the mesonotum which has distinct parapsidal furrows; scutellum large, not much raised above the mesonotum; post-scutellum clearly separated from it. Median segment large, rounded behind; the metapleuræ keeled below.

The 3rd cubital cellule in front is twice the length of the 2nd. Abdomen not much longer than the head and thorax united. Body black, pilose.

The exact systematic position of this genus can only be satisfactorily settled when the, no doubt apterous, female has been discovered. Possibly it may form the type of a new sub-family, which might be defined by the toothed apex of clypeus, bidentate mandibles, serrate tibiæ, longish metathorax, by the basal 2 abdominal ventral segments not being separated by the 2nd projecting straight or obliquely downwards, and by the absence of a curved spine on the apex of the abdomen.

*Odontothynnus bidentata*, sp. nov.

Black, densely covered with white pubescence; the lower half of the inner eye orbits narrowly above,—more widely in the centre—face, clypeus, base of mandibles, the base and outer side of the 4 front tibiæ, the spurs and tarsi and the base of the hind tibiæ, and a broad band on the apex of the pronotum, pale yellow. Front and vertex closely, distinctly, and uniformly punctured, opaque; the part behind the ocelli more shining and sparsely punctured, densely covered with long white pubescence; the clypeus with the pubescence longer. Middle of mandibles piceous, their apex black. Palpi black, the apical joints testaceous. Thorax closely, strongly punctured, opaque, the apex shining, more sparsely punctured. Abdomen opaque, shagreened, the apices of the segments smooth and shining. Hind tarsi tinged with rufous. The 1st recurrent nervure is received shortly, but distinctly behind, the 2nd shortly beyond the middle of the cellule. Antennæ opaque, almost bare. The face at the eyes above ends in a short rounded tooth, and there is a less distinct one on the lower side. The wings have a distinct fuscous-violaceous tinge, with black stigma and nervures; the 3rd cubital cellule is not much wider in front than behind.

Length 11-12 mm.

Grahamstown, Miss Sole. Martindale, Mr. Barnes.

*Odontothynnus lacteipennis*, sp. nov.

Length 10 mm. Male.

Grahamstown. September: Misses Daly and Sole.

This species is closely related to *O. bidentatus* from which it may be known as follows :—

> Costa and nervures white, the wings clear lacteous hyaline, 3rd cubital cellule distinctly narrowed behind, the recurrent nervure received in the middle; 1st transverse cubital nervure straight, oblique above. *(lacteipennis).*
>
> Costa and nervures black, the wings hyaline, the apical half fuscous violaceous; 3rd cubital cellule not narrowed behind, receiving the recurrent nervure clearly behind the middle; 1st transverse cubital nervure rounded above. *(bidentatus).*

The 3rd transverse cubital nervure is roundly curved; the 1st has not a stump of a nervure where it commences to bend towards the apex of the wing; the yellow band on the pronotum is triangularly incised in the centre; the punctuation on the head and thorax is stronger, closer, less distinct, more rugose; the tibiæ are more broadly marked with black. As in the larger species there is a yellow mark behind the top of the eyes.

## CYNIPIDÆ, ENCOILINÆ.

### *Bothrochacis*, gen. nov.

Male. Antennæ longer than the body, 15-jointed, the joints elongated. Scutellum pyramidal, rising obliquely from the base and apex to the top, the basal slope the longer, its centre raised, narrowed at the base, becoming gradually wider to the top; the cup-like depression is placed on the top of the apical slope. Parapsidal furrows absent. Metanotum with 2 stout keels in the centre. Lower part of mesopleuræ bordered by a keel, above which is an impressed line. Radial cellule open along fore margin.

The wings are long, bare, their margin not ciliated; the antennal joints 4 or 5 times longer than wide, the 3rd and 4th equal in length, the last longer than the preceding. Scutellar foveæ large, longer than wide, rounded at the base; the alar nervures are thicker than usual. The stout outer partition border-

ing the scutellar depression has a hyaline, oval spot in the centre, or it may be a hole.

The female of this genus I do not know; but the male may be readily known from any of the described genera by the pyramidal scutellum, raised in the centre, with the cup-shaped depression on the apical slope and not visible from above.

*Bothrochacis erythropoda*, sp. nov.

Black, smooth and shining; the flagellum of antennæ dark red; the legs and abdomen of a clearer, brighter red; the wings dark smoky to the areolet (which is open below); the radial cellule clear hyaline, the nervures black; the basal abscissa of radius straight, two-thirds of the length of apical, which is roundly curved; a curved, thick spurious nervure extends backwards to the transverse basal nervure; the cubitus faint, thin, not extending much beyond the middle. Abdominal hair fringe dark white. Legs sparsely covered with white hair. Male.

Length 4 mm.

Grahamstown. November: Misses Daly and Sole.

## BRACONIDÆ.

*Iphiaulax soleæ*, sp. nov.

Vermilion-red; the head, except the face, oral region, inner orbits, the outer except for an oblique mark below the middle, lower half of the propleuræ, a large mark on the mesopleuræ, rounded at the base and apex and with its basal half obliquely dilated upwards and a large mark in the centre of the metapleuræ, black; wings almost uniformly dark fuscous; costal and the 1st cubital cellule paler; the costa and stigma black. Female.

Length 9; terebra 2 mm.

Grahamstown: Misses Daly and Sole.

Antennæ stouter than usual. Front not much depressed; its furrow wide and deep. Maxillary palpi testaceous. Central area

of 1st abdominal segment with a straight stout central and a thinner, more irregular keel on either side of it; the lateral depression is bordered on the outer side by a stout keel; the 2nd is longitudinally striated, more strongly and irregularly in the centre; the basal keel not clearly defined; the basal two furrows are wide, moderately deep; the 3rd is narrower; all are closely striated; the 3rd, 4th and 5th segments have furrows, obscurely striated, on the apex, that on the 5th being the wider.

*Iphiaulax whitei*, sp. nov.

Vermilion-red; the antennæ, occiput, front and vertex, except narrowly along the eyes, the face to the clypeal depression, the upper three-fourths of the temples, the upper edge of the prothorax, narrowly in the centre, more broadly on the sides, tegulæ, an oblique mark immediately below them, the greater part of the ventral surface of the abdomen and more or less of the 3rd and 4th dorsal transverse furrows, black. Wings fuscous, the greater part of the 1st cubital cellule and the base of discoidal cellule almost hyaline; the base of the wings paler than the apex; the costa and stigma coloured like the body. Male and female.

Length 13 mm.; terebra 4 mm.

Brak Kloof Farm. March: Mrs. G. White.

Front and vertex smooth, shining, not much depressed, furrowed in the middle; face sparsely punctured; there are 2 large dull red spots immediately below the antennæ; the occiput covered with long black, the face with shorter fuscous, hair. Thorax smooth and shining; parapsidal furrows indistinct. Central lobe of petiole with stout, clearly separated longitudinal striæ, which do not reach to the apex, which, as well as the sides, are smooth; the 2nd, 3rd, and 4th segments are closely, strongly, longitudinally striated, their furrows more strongly striated, with the striæ more widely separated; the 5th segment is obscurely striated on the basal half; the others smooth; the last is paler coloured; its basal half becomes gradually, roundly narrowed; the apical much narrower. There is no area on the base of the 2nd segment, but the 2nd is there more stoutly striated. The nervures in the hind wings are black.

*Iphiaulax spilonotus*, sp. nov.

Vermilion-red, the head, except for 2 marks below the antennæ, the oral region and the inner orbits narrowly; the apex

of the pronotum narrowly, the upper part of the propleuræ, the mark largely dilated at the apex and curved downwards, the lower edge and the prosternum a large mark, longer than broad, on the apical half of mesonotum, its sides joined to the base by a narrow line, an irregular mark reaching near to the apex and dilated at the base, on the sides of the metanotum, the mesopleuræ at the base above behind the oblique furrow, a large, longish mark, wide at the apex in the centre and a line along the upper half of the base of the metapleuræ, black. Wings fuscous, paler below the stigma; the costa and stigma red; the nervures black; the recurrent nervure is received distinctly in front of the transverse cubital nervure, not interstitial. Male.

Length 9 mm.

Brak Kloof. January; Mrs. G. White.

Front and vertex smooth and shining, the former not depressed, furrowed in the middle; antennal tubercles rufous; face shagreened. Mandibles rufous, broadly black at the apex; palpi blackish, the apical joint of the maxillary, testaceous. Parapsidal furrows obsolete. The middle lobe of 1st abdominal segment irregularly longitudinally striated; the sides closely striated at the base; the 2nd and 3rd segments strongly, closely striated; the centre of the 2nd is raised at the base, the basal part widest and it is more closely striated; the 4th and 5th are shagreened in the middle; the suturiform articulation wide, deep, the other 2 furrows are narrower, especially in the centre; the sides at all the furrows are raised and smooth; there are narrow, striated furrows on all the segments at the apex. Tarsi paler than the tibiæ, their apex fuscous. The alar nervures black; the base of the cubitus pale; there is a black mark on the base of the tegulæ.

*Exothecus spilopterus*, sp. nov.

Rufous, smooth and shining; the antennæ, the hind tibiæ from near the base and the hind tarsi black; wings yellowish-hyaline; the apex of the costal cellule, the prædiscoidal cellule except for a small spot near the lower part of the transverse basal nervure, and a longer, narrow one along the lower part of the basal abscissa of the cubitus, an irregular cloud extending from the base of the stigma to the base of the radius across the wing, a slightly narrower cloud on either side of the 2nd transverse cubital nervure, extending on to the radial cellule, where it is oblique and roundly narrowed in front and behind slightly beyond the cubitus;

a cloud in the centre of the pobrachial cellule, the apex of the hind wings, their apical margin narrowly, a broad irregular cloud in the middle, not reaching to the base and a shorter, narrower one between it and the base on the apical half of the wings, fuscous; the nervure and stigma yellow on the uncoloured parts of the wings. Female.

Length 13; terebra 13 mm.

Grahamstown. November: Dr. H. Becker.

Abdomen smooth and shining; the keel on base of 2nd segment, not clearly separated, broad at the base, becoming gradually narrowed to the apex, reaching to the middle of the segment; its sides with a deep curved furrow reaching near to the apex; the 3rd segment with a shallow oblique furrow on the sides at the base.

*Exothecus capensis*, sp. nov.

Length 15 mm. Male.

Hab. Knysna. April: R. M. Lightfoot.

This species is identical in colouration with *E. tibialis*; it may be easily known by the structure of the abdomen; the raised part of the 1st abdominal segment becomes distinctly narrowed towards the base and there is a narrow furrow down the centre near the apex; the dilated part of the keel on the 2nd segment does not reach to the middle; there is a similar keel on the 3rd, a less distinct one on the 4th, and a furrow on the basal half of the 5th; the space bordering all the keels is depressed. The lateral furrows on the 2nd segment is wide and reaches near to the apex; there are oblique furrows on the sides of the 3rd, 4th and 5th segments at the base; the furrows become gradually shorter; that on the 3rd reaching to the middle of the segment. Apex of clypeus obliquely depressed. Temples roundly obliquely narrowed, as long as the antennal scape. The transverse median nervure is received nearer the transverse basal than it is in *E. tibialis*.

*Exothecus canaliculatus*, sp. nov.

Length 18-21 mm. Male and Female.

Brak Kloof. January: Mrs. G. White.

This species is similar in the colouration of the body, antennæ

and legs to *E. tibialis*, but is a larger and stouter species. In *tibialis* the transverse median nervure has a more distinct slope, and as a consequence the podiscoidal cellule is wider in front, which is not the case with the present species; the occiput is not transverse as it is in *tibialis*, but is broadly, roundly incised; the abdomen is broader, more dilated in the middle; the apex of the clypeus projects more at the base and more especially at the apex, the centre therefore appearing more depressed; the hyaline spots in the wings are larger; the 1st cubital cellule is almost entirely hyaline; there is a large cloud, longer than broad, dilated at the base, and extending beyond the middle of the cellule on the outer side of the recurrent nervure and continuous with the cloud in the 1st cubital cellule and may be continued to the apex of the wing, or separated from a spot at the outer edge; the cloud at the the 2nd recurrent nervure is large and is continued beyond the cubitus; the keel on the 2nd abdominal segment is united to the raised lateral lobe and without a distinct depression. There is a distinct oblique depression on the sides of the 3rd and 4th segments; in *E. tibialis* on the 3rd only.

### *Trichiobracon rufus*, sp. nov.

Rufous, the vertex, front, face immediately below the antennæ, the outer orbits to the bottom of the eyes and antennæ, black; wings fuscous, the costal cellule in front, the 1st cubital cellule except for a triangular cloud at the apex in front, a triangular cloud in the apex of the 1st discoidal cellule and a larger, more irregular one in front of the recurrent nervure, the greater part of the costal cellule in front and a large cloud shortly beyond the middle, hyaline; the stigma and the nervures, except in the hyaline parts, black. Body covered thickly with white pubescence. Female.

Length 12, terebra 7 mm.

Martindale. April: Barnes.

Antennæ covered with a black pile, thickest and longest at the base. Face and clypeus rugosely punctured; the lower inner orbits punctured; the depressed front furrowed in the middle. Mandibles, except at the base, and palpi black. Pro- and mesothorax smooth; the sutures striated; the furrow on the propleuræ with stout keels; their lower part closely, strongly, irregularly striated; the 2nd less strongly striated; the furrow surrounding the raised central part at the base wide, and with distinct, clearly

separated oblique striæ; the curved apical furrow more strongly striated than the central portion; the apical 3 segments are smooth; the middle finely, closely striated except at the apex. Second cubital cellule longer than wide, of equal width throughout; in length not quite double the length af the 1st abscissa of the radius. The 2 spines on the hind coxæ are large and stout; the basal stouter and twice the length of the apical.

*Trichiobracon maculifrons*, sp. nov.

Luteous, the antennæ, the centre of the front of the antennæ and the hind tibiæ and tarsi black; the fore wings to the transverse basal nervure, the base of the 1st cubital cellule, an irregular mark, broader than long near the base of the 3rd cubital cellule, and a square one at the base of the anal nervure, yellowish-hyaline; the rest dark fuscous; the hind wings yellowish-hyaline to the transverse præbrachial nervure, beyond that dark fuscous. Male.

Length 13 mm.

Martindale. April: Barnes.

Antennæ as long as the body; the scape thickly. the basal joints of flagellum sparsely covered with long hairs. Face strongly punctured, the clypeus more closely punctured, clearly separated, roundly convex. Mesonotum sparsely punctured; its depressed apex with 2 keels which converge at the apex, having a straight keel on the outer side and with some transverse ones inside. Scutellar depressions large, with 4 stout keels in the centre. Median segment sparsely punctured. The basal 3 segments of the abdomen are irregularly longitudinally striated, as is also, to a less extent, the basal half of the 4th; the suturiform articulation and a narrow transverse furrow at the base of the 4th and 5th segments are closely transversely striated. The head, thorax, base of abdomen are thickly covered with long hair; the basal tooth on the hind coxæ is long, stout and curved; in front of it is a short, stout one; the 3rd abscissa of radius is longer than the basal 2 united.

*Schönlandella*, gen. nov.

Eyes large, parallel, hairy. Malar space distinct, occiput not margined, transverse. Clypeus separated from the face, its apex transverse, shortly bituberculate in the middle. Fore wings with 3 cubital cellules; the 2nd transverse cubital nervure hyaline;

the apical abscissa long, roundly curved upwards; the recurrent nervure received near in the apex of the 1st cubital cellule; the transverse median near the base of the discoidal. Stigma large. The radius and cubitus in the hind wings extend to the apex, the transverse discoidal nervure is interstitial, the radial cellule divided in two by an oblique nerve behind the middle; the median discoidal absent; there is an axillary cellule. Middle lobe of mesonotum clearly separated, not reaching to the scutellum; parapsidal furrows deep. Post-scutellum depressed; bounded behind by a curved furrow. Median segment rugose; there is a large area in its centre, wide in the middle, gradually narrowed to the base and apex; this is bounded by 2 large areas. Abdomen short, broad, bluntly broadly rounded at the apex; sheaths of ovipositor short, broad. Legs stout, short; claws small, simple; calcaria fully half the length of metatarsus. Antennæ stout, shorter than the body. The temples are broad, roundly dilated, projecting beyond the eyes; the pterostigma large, the radius dilated at its base. There are 7 abdominal segments. Radial cellule long and narrow, extending to the apex of the wing; the radius originates shortly beyond the middle of the stigma. Second cubital cellule large, as wide at the base as at the apex. There is a large curved furrow on the lower apical half of the mesopleuræ, which is wide at the base, becoming gradually narrowed to the apex. The systematic position of this genus is not very clear. The shape of the mouth removes it from the large division of the *Cyclostomi*. Of the *Polymorphi* it reminds one of the *Ophiidæ*. It differs from all known Braconidæ in having 2 radial cellules in the hind wings, a character which is sufficient to make it the type of a new tribe. That character with the hairy eyes, tuberculated clypeus and roundly curved upwards radius make it an easily recognised genus.

*Schönlandella nigromaculata*, sp. nov.

Rufo-luteous; the antennæ, vertex, front, except near the eyes, the middle lobe of mesonotum except near the apex, the greater part of the lateral lobes, base of scutellum, the base of metanotum, a large mark on the apex of mesopleuræ, dilated forwards at the base below, and backwards at the apex (but to a less extent compared with the base), the base of metapleuræ, sternum, apex of abdomen above, coxæ, trochanters and 4 hinder tarsi, black; wings fuscous, the stigma and nervures black. Female.

Length 5 mm.

Hab., Museum Grounds, Grahamstown.

Smooth, shining, almost bare. Scutellum bifoveate at the base. The area on metanotum smooth, its base acutely narrowed to a point, the apex not so strongly narrowed and rounded; there is an indistinct transverse keel in the middle; the rest of the metanotum rugose.

*Schönlandella trimaculata*, sp. nov.

Length 5 mm. Female.

Hab., Grahamstown.

This species may be separated from *S. nigromaculata* as follows:

Pleurae, sternum, base of metanotum, and base of legs black; wings fuscous, the nervures and stigma black. (*nigromaculata*).

Mesosternum only black; the wings almost hyaline, the nervures testaceous. (*trimaculata*).

The middle lobe of mesonotum is entirely black and the lateral for the greater part; the colour of the body wants the reddish tint of *nigromaculata*, it being yellowish testaceous; the legs are similarly coloured with only the apex of the hind tibiæ and the hind tarsi black; the area on the metanotum has not the basal keels so clearly defined; the vertex is black; the black mark on the front becomes gradually narrowed towards the base of the antennæ; the 2nd transverse cubital nervure is pale.

*Schönlandella nigricollis*, sp. nov.

Black, thickly covered with a white down; the abdomen, except the apical segment, and the legs, except the coxæ and the posterior tarsi, rufo-luteous; wings fuscous, paler at the base, the costa and base of stigma luteous, the rest and the nervures black. Female.

Length 6 mm.

Museum Grounds, xi. '01, Grahamstown.

Antennæ stout, 33-jointed, covered with a microscopic down. Parapsidal furrows closely striated, more strongly towards the apex. Scutellar depression closely, stoutly striated, as is also the depression at the sides of the post-scutellum. Median segment opaque, closely rugose. Tibiæ and tarsi densely, shortly pilose.

Centre of basal segment raised, narrowed at the base, clearly separated.

*Mesoagathis*, gen. nov.

Malar space large, but not quite so long as the eyes, the face not much narrowed below; apex of clypeus broad, transverse; the face broadly raised in the middle, foveate laterally at the apex; the labrum large, broadly rounded at the apex. Front not excavated. Occiput roundly incised. Radial cellule short, not reaching to the middle of the apical part of the margin; 1st cubital and 1st discoidal cellules confluent; areolet almost square; transverse basal nervure interstitial. Hind wings with a closed discoidal cellule. Foreclaws cleft. Calcaria very short. Apex of median segment transverse, the sides slightly roundly projecting; in the centre is a large area which extends to the top of the apical slope; beneath it is a small, broader than long area; the sides are margined; the spiracles moderately large and long.

The trophi are elongated; the maxillary palpi 5-jointed; the parapsidal furrows distinct, the middle lobe of mesonotum clearly separated. Abdomen (in male) sessile, shorter than the thorax. Legs stout, the metatarsus as long as the following 3 joints united. Mandibles curved, longish, edentate. Scape of antennæ fully 3 times longer than thick, narrowed at the base. Apex of scutellum transverse, margined.

The malar space is not quite so long, nor so much narrowed below as in the typical *Agathidini*, but it is longer than in the typical *Microdini*. In some respects it approaches *Disophrys*, but the hollowed front with keels separates that genus.

*Mesoagathis fuscipennis*, sp. nov.

Black, shining; the legs red; all the coxæ, trochanters, apex of hind tibiæ and hind tarsi black; wings dark fuscous, iridescent, the nervures and stigma black. Male.

Length 7-8 mm.

Grahamstown. November: Misses Daly and Sole.

Antennæ as long as the body. Face and clypeus thickly, the rest of the head sparsely covered with long white hair; the raised central part of the front bordered on the outer side by a stout keel; in the centre is a narrower keel. Pro- and mesothorax shining; their pleuræ thickly covered with white pubescence;

the rounded apex of the middle lobe of mesonotum with stout striæ. Scutellum roundly convex, sparsely punctured. Area on metanotum with some stout, irregular keels, its sides irregularly rugosely punctured, more strongly at the apex than at the base. The curved depression on the lower part of the mesopleuræ has some irregular keels ; the metapleuræ coarsely punctured, almost reticulated. Legs densely pilose ; their hind coxæ not much lengthened. The temples are rounded, not narrowed.

*Apanteles basimaculo*, sp. nov.

Black ; the basal 2 segments of abdomen whitish testaceous, the 4 front legs testaceous, tinged with fulvous, their coxæ black ; the hind legs black, a band, slightly longer than the black base, close to the base of the hind tibiæ and the calcariæ whitish testaceous, the tarsi for the greater part testaceous ; wings clear hyaline, the nervures black ; antennæ dark testaceous, darker towards the apex. Male.

Length 4 mm.

Museum Grounds, Grahamstown. November : Misses Daly and Sole.

First abdominal segment slightly, but distinctly longer than its width at the apex, becoming gradually, slightly wider towards the apex, slightly longer than the 2nd, which is again slightly longer than the 3rd ; the basal 3 segments with a smooth, slightly raised line down the centre ; alutaceous ; the other segments smooth and shining, Palpi testaceous. Pro- and mesonotum alutaceous, almost punctured; metanotum rugulose, stoutly keeled down the centre; on the sides at the apex are 2 short keels, the outer straight, the inner curved. Pro- and mesopleuræ closely punctured, the apex of the former and a large spot on the apex of the latter in the centre smooth and shining ; the metapleuræ rugosely punctured, with a smooth space on the upper half at the base. The basal abscissa of radius, the 1st (and only) transverse cubital nervure, the cubitus beyond the latter (this part separated from the basal branch by a bulla) are thickened, the other parts faint and narrow ; the radius from the areolet narrow and faint. Antennæ longer than the body ; hind spurs white.

*Apanteles maculitarsis*, sp. nov.

Black, the basal half of the ventral surface of abdomen

testaceous; legs testaceous, with a fulvous tinge, the 4 posterior coxæ black, the apex of the hind tibiæ, and the apices of the hinder tarsal joints broadly fuscous-black; wings clear hyaline, the stigma and nervures fuscous. Female.

Length 3 mm.

Grahamstown. January: Miss Page.

1st abdominal segment as broad as long, its sides testaceous, the 2nd not quite so long as it and clearly shorter than the 3rd; all the segments smooth and shining; the basal ventral testaceous; ovipositor very short. Antennæ black, longer than the body. Head and thorax smooth and shining. The nervures bounding the 1st cubital cellule are roundly curved, thickened in the middle, narrowed below. The 2nd and 3rd segments are not keeled in the middle. Median segment smooth and shining, not keeled in the centre; the 1st abdominal segment has a more perpendicular slope than usual, its apex is raised in the centre; the hypopygium largely projects; the 2nd segment has 2 depressed lines running obliquely from the base to the apex, the central part thereby being narrowed at the base.

## ICHNEUMONIDÆ.

### *Ophiononeura*, gen. nov.

Disco-cubital nervure not broken by a stump of a nervure; transverse basal nervure interstitial; disco-cubital cellule without blister spots; transverse median nervure in hind wings not broken by a nervure. Apex of clypeus transverse; largely foveate at the sides above. Mesonotum rugose, without furrows. Metanotum with two areæ at the base, their keels broadly rounded; the spiracles about 3 times longer than wide. Abdomen long, slender, compressed; the ovipositor long. The antennæ are short, thickened towards the apex; the clypeus depressed in the middle; mandibles curved, narrowed towards the apex; middle tibiæ with one spur; claws not pectinated; tarsi spinose; abdomen three times as long as the thorax; wings short; the entire thorax rugose; the apex of median segment not produced; scutellum

roundly convex; the spiracles on the 1st abdominal segment are placed at the base of the apical third, the disco-cubitus is roundly curved; the 1st discoidal cellule at the base half the width it is at the apex.

Comes nearest to the American genus *Ophionopterus*. The unbroken transverse median nervure in hind wings separates it from its Old World allies.

*Ophiononeura flavo-maculata*, sp. nov.

Dark rufous; the eye orbits, except in the middle above and below, 2 marks, narrowed towards the base at the base of the mesonotum, a shorter, narrower one at the tegulæ, the scutellums, a line on the upper part of the propleuræ, and one below and in front of the tegulæ ivory-yellow; the 3 sternums, propleuræ at base, and the space at the sides of scutellums black, wings hyaline, the stigma testaceous, the nervures black. Female.

Length 15 mm., terebra 5-6 mm.

Grahamstown. Feb. and April: Misses Daly and Sole.

Head in front closely punctured; the front keeled in the centre. The rugose punctuation on the thorax runs into reticulations in places; the basal 3 segments of the abdomen, beneath, are ivory-yellow at their junction; the middle tarsi fuscous, the hind black.

*Limneria africana*, sp. nov.

Black; the mandibles, palpi, tegulæ, a spot at its base, the four front coxæ and trochanters, pale yellow; the four front femora and tibiæ fulvous, their tarsi fuscous, the hind legs black, the fore trochanters pale yellow, the tibiæ broadly dark testaceous, the spurs yellow; wings hyaline, the stigma testaceous, the nervures black; areolet appendiculated, the pedicle as long as the lower basal nervure; abdomen black; the 2nd segment with a distinct fulvous-yellow band on its apex; antennæ black. Female.

Length 4-5 mm.

Museum Grounds, Grahamstown. November: Misses Daly and Sole.

Head, pro- and mesothorax alutaceous. Metanotum with 5 areæ, besides the large posterior median, which is transversely striated, strongly, distinctly, but not very closely; the areola is

twice longer than broad ; the base becomes gradually narrowed to a sharp point ; the apex is wide and transverse ; the segment is thickly covered with silvery pubescence.

The male is similarly coloured ; there is a narrow band on the ower side of the 3rd segment and a wider one on its apex.

## Notes on two Reptilian Tarsi in the Albany Museum.

By R. BROOM, M.D., B.Sc., C.M.Z.S., Victoria College, Stellenbosch.

The first specimen consists of the left foot, with portions of the tibia and fibula, and a few rib fragments of a small reptile, about the size of a cat. The specimen was found near Bedford by the Rev. D. D. Fraser, and presented by him to the Museum. From the horizon of the locality it is practically certain that the remains are those of either a *Dicynodont* or a *Therocephalian* reptile, and though the tibia and fibula are too imperfect to settle the question, it is very probable that the specimen represents a species of *Dicynodon*. The foot is certainly not that of *Lystrosaurus*, and probably not that of *Oudenodon*. Though the tarsus is very imperfectly preserved, it is of great interest. The proximal part consists of a large semicircular tibiale and a fibulare which may have been even larger, but which is only preserved in part. The tibiale is very similar to the tibiale of *Oudenodon trigoniceps*. To the distal end of the tibiale is articulated a well ossified navicular or centrale exactly as in the mammalian tarsus. It articulates with the four tarsalia and probably also with the large fibulare. Portions of all four tarsalia are preserved, the fourth being a bone of large size and apparently giving articulation to the fourth and fifth metatarsals. It will thus be seen that we have a tarsus which is quite mammalian in type. In the tarsus of *Oudenodon trigoniceps* the centrale is probably cartilaginous, but in another tarsus probably of *Oudenodon* the centrale is partly ossified. In this tarsus it is as well ossified as any of the other tarsal bones and resembles the mammalian bone in being considerably broader than long. The specimen does not show whether an intermedium may or may not have been present.

The other specimen consists of the right hind limb of *Saurosternon Griesbachi*, with a few fragments of vertebrae and other bones. It was discovered at Cradock by Dr. Grey. The femur is fairly stout, and considerably curved at its lower end. The tibia and fibula are both well developed ; the tibia being con-

siderably stouter than the fibula. The foot is crushed laterally, but the bones of the tarsus can be fairly satisfactorily made out. There is a large broad bone which articulates with both the tibia and fibula, and which is probably composed of the anchylosed tibiale, intermedium and centrale. To the outer side of this large tarsal bone is a smaller bone, which is probably the fibulare. The distal row of tarsal bones is made up of a small first tarsale, a somewhat larger second tarsale, a third small tarsale, and a fourth very large tarsale. There is no evidence in the specimen of a fifth tarsale. All the five metatarsals are well preserved. The fourth is the longest; the third a little shorter, and the second shorter than the third. The first is much shorter than the second, and the fifth considerably shorter than the first. The fourth toe has five phalanges. There is no specialisation of the fifth metatarsal such as is seen in *Sphenodon*, and the tarsus differs from that of *Sphenodon* in having the fibulare distinct and in having the first and second tarsalia well developed. It would thus appear that whatever be the position of *Saurosternon* it is not closely allied to *Sphenodon*, and as far as the tarsus is concerned it is distinctly more primitive.

## On a new South African Labyrinthodont (*Cyclotosaurus Albertyni*). By R. BROOM, M.D., &c.

In the collection of Mr. Alfred Brown of Aliwal North, there are numerous teeth, small skull fragments and portions of vertebrae of a *Labyrinthodont* of much larger size than *Rhytidosteus*. In the neighbourhood of Burghersdorp I discovered a large interclavicle and other fragments of probably the same

large animal. Till recently, however, the remains have been too fragmentary to warrant description. But a few months ago one of my students, Mr. R. A. Albertyn, obtained near Rouxville, O.R.C., a large number of fragments of the skull of what is perhaps the same *Labyrinthodont* as occurs at Aliwal North and Burghersdorp. The fragments only represent about a third of the upper surface of the skull, and it has been found impossible to fit all of them together, still as it has been possible to reconstruct the greater part of the right orbital and temporal regions and the left prefrontal and frontal bones, a very fair idea is obtained of the structure of the skull, and it becomes manifest that the animal is a species of *Cyclotosaurus*.

The orbit measures 60 mm. in length and 46 mm. in breadth. Externally about 18 mm. of the margin are formed by the jugal bone, while the whole of the anterior border is formed by the prefrontal bone. The frontal bone is almost excluded from the orbit, but the external corner of the frontal just separates the prefrontal from the postfrontal. The postfrontal forms the whole of the inner, and posterior margin of the orbit to the middle line of the orbit behind, where it meets the postorbital. It is thus seen that the orbit is almost exactly similar in structure to that in *Cyclotosaurus robustus*, the only difference being that the frontal scarcely forms any part of the orbital margin.

The frontal bone is relatively narrower and the prefrontal wider than in *C. robustus*, the former being 50 mm. wide, and the latter about 90 mm.

From the back of the orbit to the front of the auditory notch is 95 mm.

The postorbital bone is relatively considerably larger, and the squamosal, though imperfect, apparently smaller than in *C. robustus*. Anteroposterior length of the postorbital is about 85 mm.

The auditory notch, though imperfect behind, has apparently been closed. Its greatest transverse measurement is 48 mm., and the anteroposterior measurement was probably about the same. From the anterior border of the auditory foramen to the nearest point of the back margin of the skull is about 90 mm.

If the anterior part of the skull bears the same proportion to the hind part in *C. robustus*, and it is possible from the larger size of the prefrontal that the anterior part may be relatively even larger in the S. African form, then the whole skull was, not improbably, from 650 to 700 mm. in length.

I have much pleasure in naming the S. African species after Mr. R. A. Albertyn.

*Cyclotosaurus robustus* occurs in the Upper Trias of Germany, and it is probable that the S. African beds in which *O. Albertyni* occurs, are of similar age, since the Stormberg beds immediately above are according to Seward, most probably of Rhætic age.

## On a new species of *Oudenodon (O. megalorhinus)* from the Gough, S. Africa. By R. BROOM, M.D., &c.

Close to Prince Albert Railway Station I recently found the skull of a small *Oudenodon*, which must be referred to a new species. If the skull is mature, which the condition of the bones would lead one to believe is not improbable, then it is the smallest *Oudenodon* yet discovered.

The upper surface of the skull and almost the whole of the right side are practically perfect, but the left temporal arch and the greater part of the left maxillary are lost. The main features of the skull are the large size of the external nares, the narrow interorbital region, with moderately broad parietal region, and the great outward development of the squamosal bones.

The posterior part of the skull resembles very closely that of *O. gracilis*. The parietal foramen is, however, here situated in an elevated portion of the skull roof. The preparietal bone is of large size, and is supported on either side by the parietals. The squamosal resembles considerably that of *O. gracilis* in the peculiar outward development of the part which forms the temporal arch. In this new species the outward process is much

more marked, so that the posterior and outer border of the squamosal bone makes an angle of about 50° with the middle line.

The most important new anatomical fact revealed by this skull is the presence of a distinct postfrontal bone. Until recently, the large bone which forms the greater part of the postorbital arch, and a large part of the inner wall of the temporal fossa in Dicynodont reptiles, has been believed to be the postfrontal bone. As in *Lystrosaurus*, however, there is a narrow bone between this large bone and the frontal, which must be looked upon as the postfrontal, the large bone must be regarded as the postorbital, as I recently pointed out (Rec. Alb. Mus., Vol. 1., Pt. 1., p. 4). Until now no other Dicynodont reptile than *Lystrosaurus* has been known to have a distinct postfrontal bone, and it was believed to be absent in *Dicynodon* and *Oudenodon*. This little skull of *Oudenodon* which shows the sutures in this region most beautifully, shows in each side a distinct narrow little postfrontal bone almost exactly as in *Lystrosaurus*, between the frontal and post-orbital bones, and forming part of the orbital margin.

Each frontal is a narrow bone which runs back between the anterior process of the parietal and the postfrontal to the level of the parietal foramen.

The sutures in the anterior part of the skull are not very distinctly seen, and it is, therefore, impossible to describe the different bones. The snout is rounded and fairly smooth, there being much less elevation of the bones above the nostril than in *O. gracilis*.

The nostril is relatively much larger than in *O. gracilis*, and the antero-posterior measurement is about equal to the distance between the orbit and the nostril.

The under surface of the skull is very imperfect. The right pterygoid is, however, well preserved.

I have proposed for this species the name *Oudenodon megalorhinus*.

The following are some of the principal measurements :—

| | |
|---|---|
| Greatest length of the skull, | 65 mm. |
| Greatest breadth, | 48 mm. |
| Length of orbit, | 16 mm. |
| Distance between orbits, | 9·5 mm. |
| Distance between temporal fossæ, | 16·5 mm. |

## Notice of a new Fossile Reptile (*Scapanodon Duplessisi*) from the Lower Karroo beds of Prince Albert, Cape Colony. By R. BROOM, M.D., &c.

Some time ago Mr. P. H. Du Plessis discovered a number of bones of large reptiles on his farm, Zeekoegat, in the district of Prince Albert, C.C. At the request of Mr. W. L. Sclater, Director of the S. African Museum, I recently visited the spot and examined the remains. I found the detached bones of probably a considerable number of individuals scattered over a considerable area, but mostly confined to a single stratum. Most of the bones were badly weathered and much broken, but three fairly perfect humeri were obtained, as well as two imperfect scapulæ, one or two vertebrae, and a few other bones. A number of small fragments of skulls were discovered, but not in very close association with the other bones. It is probable that the fragments are portions of the skulls of three different individuals, and though at present it is impossible to be certain, it is likely that all the skulls and all the other bones belong to the same species. The humeri equal in size that of *Titanosuchus*, and the jaw fragments which bear teeth show that the animal was probably allied to *Titanosuchus*, though belonging to a different genus. To avoid any possible confusion, however, I will take as the types, two imperfect jaws showing a series of molar teeth, and belonging to the same skull.

One of the two jaw fragments is a considerable part of the right dentary. It shows evidences of two fairly large incisors, with a portion of a very large canine. Behind the canine can be seen at least 11 relatively small molars. These small molars follow the canine in much the same way as in *Titanosuchus*, but they differ in being considerably smaller and much flatter. Roughly it may be said that three molars in *Scapanodon* occupy the same space as two in *Titanosuchus*. The remarkable feature of the genus, so far as is shown by the specimens, is the structure of the molars. The deeper part of the root is in section a narrow

oval, and as it approaches the alveolar margin it becomes still flatter, so that the section is like the winged stem of a plant. The part of the tooth outside of the bone shows a fair sized root portion apparently devoid of enamel, and with the edges moderately parallel, and a remarkably constructed crown. The external root portion of the tooth is so flattened that in one specimen—possibly a maxillary molar—it measures antero-posteriorly 8 mm., and is only 2 mm. thick. In the crown the flattening is continued to an even greater extent. Antero-posteriorly it seems to be about 10 mm., though no perfect specimen has yet been displayed, and the height of the crown appears to average about 13 mm. The thickest part of the crown is not more than 2 mm., and from the centre it thins off towards the edges. The tooth is strengthened by being slightly concavo-convex. The external surface of the tooth is not grooved, though slightly uneven, and there are no serrations at the edges visible. The layer of enamel is very thin, about .15 mm.

If the limb bones belong to the same animal as the jaw fragments, *Scapanodon* must have been as large an animal as *Titanosuchus*, as one of the humeri measures in length 535 mm., and is thus exactly the same size as the humerus referred by Seeley to *Titanosuchus ferox*. The two humeri differ considerably if Seeley's account is correct.

The measurement from the front of the root of lower $m^1$ to back of lower $m^{10}$ is 95 mm. In *Titanosuchus ferox* a similar measurement made on the figure gives 136 mm.

I have much pleasure in naming the new reptile after Mr. P. H. Du Plessis, of Zeekoegat.

## Notice of a new Endothiodont genus *(Chelyoposaurus)*. By R. Broom, M.D., &c.

About a year ago there was discovered in one of the Kimberley mines a block of sandstone, containing the remains of a small fossil reptile. This was sent down to Capetown to the Director of the Geological Survey for examination, and I have been asked by him to undertake the determination of the form.

The specimen consists of the remains of a small Dicynodont reptile, which, when complete, would probably be about a foot and a half in length. As the bones are preserved in a sandstone rock, and are very friable, very little has been possible in the way of development. Almost the whole of the presacral part of the vertebral column is preserved, there being remains of 26 vertebræ preserved in front of three others which are evidently sacral. On the right side, portions, at least, of most of the ribs are preserved. The greater part of the right arm is also present, though the bones of the carpus and phalanges are displaced. The left femur is almost perfect. Of the skull the greater part has been lost, but there is still preserved the almost complete left temporal arch, with a large part of the maxilla, and the greater part of the left mandible.

All the bones of the skeleton are typically Dicynodont. The skull has the usual enormous squamosal, which passes outward as in *Opisthoctenodon*. The jugal passes far back on the underside of the squamosal arch. The maxillary, so far as preserved, is very similar to that in the other small Endothiodonts and in *Oudenodon*. It contains at least one small maxillary tooth which is not a canine. The tooth seems to be quite free of serrations.

The greatest length of the squamosal bone is 41 mm., and the length of the skull when perfect would probably be about 90 mm.

Though the skull closely resembles that of *Oudenodon*, the presence of the small molar (the evidence does not show whether there may have been others) places the form among the Endothiodonts, and entitles it to be regarded as a new genus. I propose to name the specimen *Chelyoposaurus Williamsi*, after Mr. Gardiner Williams. The specimen will be described at greater length and figured elsewhere.

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## VOL. I.

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On the use of the term Anomodontia. By R. BROOM.

Preliminary notice of some new Fossil Reptiles, collected by Mr. ALFRED BROWN, at Aliwal North, South Africa. By R. BROOM.

Notes on the Localities of some Type Specimens of the Karroo Fossil Reptiles. By R. BROOM.

Report on some South African Species of *Indigofera* in the Albany Museum Herbarium. By E. G. BAKER.

On some South African Species of *Aloe*, with special reference to those contained in the Herbarium of the Albany Museum. II. By S. SCHÖNLAND.

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# On the Hymenoptera of the Albany Museum, Grahamstown, South Africa.

By P. Cameron.

(Second Paper).

## APIDÆ.

*Halictus volutatorius*, sp. nov.

Black, the abdomen ferruginous, tegulæ piceous red; wings clear hyaline, the stigma fuscous, the nervures darker coloured. Female,

Length 6 mm.

Brak Kloof. Mrs. G. White.

Antennæ fuscous beneath towards the apex. Clypeus shining, strongly but not closely punctured; the face more weakly punctured. Apex of clypeus fringed with short golden pile, and more sparsely with long white hair. Front alutaceous, thickly covered with fuscous pubescence, the vertex shining. Pro- and mesonotum shining, sparsely punctured.

Metanotal area closely, finely reticulated, without an apical border. Mesopleuræ coarsely alutaceous, opaque. Base of 1st abdominal segment sparsely covered with long white hair, the apical thickly covered with white pile and more sparsely with long white hair; the segments smooth and shining. Anal rima rufo-piceous, bordered with golden pubescence. The basal 3 abscissæ of radius become successively longer, but not much; the 3rd transverse cubital nervure in front has a small part straight and oblique, the rest roundly curved.

*Halictus iridicolor*, sp. nov.

Dark green, thickly covered with fulvous pubescence on the head and thorax, with white on the abdomen; the front and vertex blue, streaked with violet; the mesonotum, scutellum and base of metanotum rosy red, streaked with blue. Legs black, thickly covered with white hair, the 4 anterior tibiæ and tarsi testaceous in front. Wings hyaline, the stigma and nervures pallid testaceous. Antennæ black, the flagellum brownish below. Female.

Length 8 mm.

Brak Kloof. Mrs. G. White.

Base of metanotum closely, minutely punctured, the central area less strongly than the sides.. Clypeus strongly, but not closely punctured; the face slightly punctured. Mandibles broadly rufo-testaceous in the centre. The hair on the face and clypeus long and white. Head and thorax closely and strongly punctured; the abdomen minutely punctured; the rima dark rufous.

A robust species.

*Halictus bidens*, sp. nov.

Black; the head, thorax and ventral surface of abdomen thickly covered with long grey hair, that on the mesonotum mixed with black. Wings hyaline, the stigma fuscous, the nervures blackish; the 3rd cubital cellule narrowed in front, shorter than the 2nd, the 3rd transverse cubital nervure roundly, broadly curved, the 1st recurrent nervure almost interstitial. Apex of clypeus transverse, the sides projecting into stout teeth. Metanotal area stoutly keeled behind, closely, strongly longitudinally striated. Head and thorax not distinctly punctured, the lower half of metapleuræ closely, finely obliquely striated. Apex of clypeus with a deep, longer than wide depression in the centre, wider towards the apex; the sides bordering it stoutly, irregularly striated. Malar space large. Abdomen smooth, the base shining; the apical segment above sparsely covered with longish black hair; rima blackish, bordered with rufous.

Length 8 mm.

Salem. R Webber. November.

*Halictus kloofensis*, sp. nov.

Black, the mandibles broadly ferruginous in the middle, the flagellum rufous below; the apical joints of the tarsi bright ferruginous; wings clear hyaline, the stigma and nervures black; the 3rd cubital cellule narrowed in front, equal in length with the 3rd; 1st recurrent nervure received not far from the transverse cubital; the 2nd at the base of the apical third of the cellule. Metanotal area coarsely, irregularly reticulated, without an apical bordering keel. Clypeus strongly, but not closely punctured. Front finely, closely rugose, and covered thickly with fuscous hair; the vertex is not so closely nor distinctly punctured. Mesonotum strongly punctured; the apex of metanotum sparsely punctured, with a shagreened appearance; its centre largely hollowed. Abdomen smooth, the base of the segments with a band of depressed white pile. Apices of ventral segments pale; the penultimate thickly covered with long golden hair. Tegulæ dark piceous. The hair is cinereous; on the front it is darker coloured, and the mesonotum tinged with fulvous, as is also the hair on the underside of the tarsi. Male.

Length 9 mm.

Brak Kloof. Mrs. G. White. March.

*Halictus Whiteanus*, sp. nov.

Black, the pubescence cinereous, on the apex of the abdomen and tarsi bright fulvous; on the tibiæ it is tinged with fulvous; wings hyaline, tinged with fulvous, iridescent, the stigma testaceous, the costa and stigma darker. Female.

Length 10-11 mm.

Brak Kloof. Mrs. G. White.

Apex of clypeus slightly curved, sparsely punctured, the apical half more sparsely than the basal; the face shining, almost impunctate in the centre, almost bare, the sides densely pilose, closely wrinkled. Mesonotum and scutellum closely, strongly punctured, the latter depressed in the centre. Basal area of metanotum closely, irregularly longitudinally reticulated, striated, the apex not bordered; in the centre is a fine longitudinal keel. The basal 2 segments of the abdomen are closely and distinctly

punctured and depressed; the base of all the segments covered with white depressed pubescence; the apices with longish white pubescence; the rima is bright rufous, and is fringed with bright ferruginous hair.

Comes close to *H. deceptus*, Sm., which may be known from it by the pile on the head and thorax being rufous, by the metanotal area being closely and regularly rugose, by the basal 2 segments of the abdomen not being closely and regularly punctured, and by the anal rima being black.

*Halictus heliophilus*, sp. nov.

Black, the apices of the abdominal segments testaceous, the knees, tibiæ and tarsi rufo-testaceous; the 4 front-tibiæ broadly yellow in front, the fore tibiæ behind in the middle and the hinder in the middle all round black; the wings clear hyaline, the stigma and nervures pallid testaceous. Flagellum of antennæ brownish beneath. The pubescence white. Tegulæ testaceous yellow. Female.

Length 7 mm.

Grahamstown. Misses Daly and Sole.

Clypeus shining, sparsely punctured; the front and vertex closely, uniformly and rather strongly punctured, as are also the mesonotum and scutellum. Metanotal area closely reticulated except round the apex. Apex of clypeus transverse, the sides projecting into short blunt teeth, rounded at the apex. Third transverse cubital and 2nd recurrent nervures very pale, the former broadly curved outwardly; the 2nd abscissa of radius not much longer than the 1st, and clearly shorter than the 3rd. Anal rima piceous; the segment at the sides rufous, the hair also tinged with rufous. First abdominal segment minutely punctured.

I am not sure but that this may be *H. pallidipennis*, Sm.; but without an examination of the type it is impossible to decide this from the description.

*Halictus transiens*, sp. nov.

Black, the hair white, the underside of the flagellum fuscous; wings hyaline, the stigma fuscous, the nervures pallid testaceous.

the 1st and 2nd transverse cubital nervures paler than the others, roundly curved ; the 3rd with the upper half obliquely sloped ; the 2nd cubital cellule half the length of the 3rd ; 1st recurrent nervure received in front of the 2nd transverse cubital, almost interstitial. Metanotal are closely, rugosely punctured throughout ; the sides to the centre rounded, clearly margined ; the centre almost transverse. Female.

Length 5 mm.

Museum Grounds, Grahamstown. November. Misses Daly and Sole.

Front, face and clypeus thickly covered with white pubescence, clypeus strongly, almost rugosely punctured except on the apex ; face irregularly rugose. Front and vertex opaque, coarsely alutaceous. Mesonotum and scutellum shining, sparsely, indistinctly punctured. Pleuræ finely rugose. Abdomen shining, impunctate, the apices of the segments testaceous.

*Halictus collegus*, sp. nov.

Black, the apex of the clypeus pale lemon-yellow ; the under side of the flagellum, the tarsi for the greater part testaceous, wings hyaline, the nervures and stigma fuseous ; the 2nd cubital cellude hardly one half the length of the 3rd, the 1st recurrent nervure interstitial, tegulæ yellowish testaceous on the outer, black on the inner half ; base of metanotum irregularly longitudinally striated. Male.

Length 6 mm.

Museum Grounds, Grahamstown. November.

Lower part of front, face and clypeus thickly covered with white pubescence ; the hair on the thorax white. Head, pro-, mesonotum and scutellum closely, finely, distinctly punctured ; the upper part of the mesopleuræ closely punctured, the hind part longitudinally striated, the striæ distinct and clearly separated. Apex of metanotum smooth, shining, bare ; it is bordered by a stout keel. Abdomen smooth, shining, the apices of the segments piceous.

The 1st and 2nd transverse cubital nervures are straight, slightly oblique ; the 3rd oblique in front, broadly rounded below. Face not elongated. Apical half of mandibles rufous.

*Halictus ferinus*, sp. nov.

Black, the hair white, the clypeus fringed with golden hair ; antennæ deep black ; wings hyaline, the nervures and stigma black ; the 2nd cubital cellule two-thirds of the length of the 3rd ; the 1st recurrent nervure received shortly in front of the transverse cubital, almost interstitial ; the 2nd reaping-hook-shaped, received at a distance from the transverse cubital, which is roundly, broadly curved. Metanotal area closely, uniformly reticulated. Female.

Length 6-7 mm.

Grahamstown, September. Misses Daly and Sole.

Clypeus strongly punctured, the punctures clearly separated. Face weakly, sparsely punctured. Front and vertex opaque, finely, closely coriaceous. Pro- and mesonotum and scutellum shining, obscurely, sparsely punctured. Pleuræ opaque, alutaceous, the apex of the meso- obscurely striated above, below minutely punctured ; the meta- closely, finely, not very distinctly punctured. Metanotum not bordered by keels. Abdomen smooth, the segments not depressed ; the rima obscure, rufous.

The wings in certain lights are highly iridescent, and have a slight fuscous tinge.

*Halictus designatus*, sp. nov.

Black ; apical half of mandibles ferruginous ; apical half of flagellum brownish below ; the pubescence white, except on the tarsi, where it is ferruginous ; apical joints of tarsi rufous ; calcaria testaceous ; wings hyaline. the stigma and nervures testaceous. Female.

Length 6 mm.

Brak Kloof, November. Mrs. G. White.

Metanotal area closely, strongly reticulated-striated, the sides more distinctly striated, the striæ oblique. Clypeus shining, very sparsely punctured on the apex, more closely on the base, the sides impunctate. Centre of face broadly, roundly raised,

punctured ; the sides much more closely punctured. Front and vertex closely rugosely punctured, opaque. Pro- and mesothorax closely, distinctly punctured, the pleuræ more closely and rugosely than the mesonotum. Apex of metanotum transverse in the middle above, without a smooth border. Abdominal segments closely, distinctly punctured, the basal more strongly than the apical ; the base and apices of the segments covered with a white pile ; anal rima rufous, the last segment fringed with golden hair. Basal 3 abscissæ of radius of equal length ; 2nd recurrent nervure received at a greater distance from the cubital than the first.

*Paranomia quadrituberculata*, sp. nov.

Black ; the abdomen with 4 white smooth, broad bands ; the body closely, strongly punctured, the punctuation on the metanotum and abdomen more widely separated and stronger than on the rest. Scutellum in the centre broadly, roundly depressed in the centre, the sides being thereby tuberculated ; basal area of metanotum with a row of stout striæ at the base, the rest aciculated, opaque ; the sides near the apex project into short, somewhat triangular teeth. Tegulæ small. The lower part of the front, face and clypeus densely covered with white pubescence ; the temples, pleuræ and base of abdomen thickly covered with longish white hair. Legs covered with white hair ; the tarsi bright red ; calcaria rufo-testaceous. Wings hyaline, stigma fuscous, the nervures blackish ; 2nd cubital cellule half the length of the following, smaller than usual, of equal width, the 1st recurrent nervure interstitial. Antennal flagellum brownish, black above. The 2nd abdominal segment with a smooth, transverse line in the middle. Female.

Length 5 mm.

Brak Kloof, February. Mrs. G. White.

*Paranomia Whiteana*, sp. nov.

Black ; the abdomen with (4 in female, 5 in male) smooth, shining, white bands ; the hair on the head and thorax fulvous when fresh, grey when old ; wings hyaline, the stigma testaceous, the costa and nervures blackish ; the hind femora and tibiæ in male not much more dilated than in the female.

Length 9 mm.

Museum Grounds. Grahamstown.—Brak Kloof. Mrs. G. White.

Head and thorax closely, but not strongly punctured; the clypeus with larger, more widely separated punctures; the front and face thickly covered with longish hair. Scutellum slightly depressed in the middle. Metanotal area closely, finely reticulated, smooth along the edges. Abdomen smooth, shining; anal rima smooth, piceous, bordered by fulvous pubescence. Male antennæ stout, brownish beneath; the last joint acutely pointed at the apex. The pubescence on the head and thorax is probably normally fulvous, becoming grey with age.

*Stictonomia*, gen. nov.

Male. Scutellum laterally at the apex projecting into a stout spine, which is nearly as long as the scutellum, originates from the base and becomes narrowed towards the apex, which is bluntly rounded. Thorax and abdomen strongly, deeply punctured, the abdominal depressions covered with depressed white pile. Tegulæ very large. Hind femora not much swollen. Antennæ simple. Middle tibiæ with a long spine. Wings as in *Nomia*.

The affinities of this genus or sub-genus are clearly with *Nomia* from which and *Paranomia*, and *Hoplonomia* it may be known by the strongly spined scutellum which is not depressed in the middle. *Hoplonomia* has the post-scutellum spined; but the spines are much shorter and more slender than the scutellar spines in this genus. The body is much more strongly punctured than it is in *Nomia*.

*Stictonomia punctata*, sp. nov.

Black, densely covered with longish white pubescence, the flagellum of antennæ rufous, darker towards the apex, the legs except the coxae and trochanters, of a brighter red, the femora darker behind; wings hyaline, the stigma and nervures blackish. Tegulæ dark rufous, the flattened apical part whitish. Apical half of mandibles dark piceous. Ventral surface rufous, brighter coloured on the sides. Male.

Length 7 mm.

Brak Kloof. March. Mrs. G. White.

Front and vertex closely and rather strongly punctured, covered somewhat thickly with longish grey hair, that on the front being the longer. Face and clypeus much more thickly covered with whitish pubescence. Labrum rufous, smooth, a minute depression in the centre above. Mesonotum and scutellum finely, closely punctured, and with larger, deeper, scattered punctures; the punctures on the scutellum are larger and deeper. Post-scutellum thickly covered with grey, longish pubescence. Basal area and metanotum smooth and shining; the rest bearing deep, round, clearly separated punctures. Propleuræ closely, strongly striated. Mesopleuræ strongly punctured, the meta- not so closely nor so strongly. Legs thickly covered with long white hair; the hind tibiæ and base of tarsi stout. The apices of the abdominal segments are smooth; the base of the middle ones depressed and thickly covered with a white pile. Apex of wings slightly smoky.

Morice (Results of the Swedish Zool. Expedition to Egypt and the White Nile, 1901, No. 14, Hymen. Aculeata, p. 6), describes the male of what he supposes to be *N. tegulata*, Sm. It has the scutellum as in the species I have described, and, otherwise, appears to be closely related. In *tegulata* (male) *teste* Morice, l.c., joints 4 to 12 are "about as long as broad" and joints 3-13 are "little longer than the others": in my species they are clearly longer than broad, and the 3rd is about equal in length with the 4th; the last is slightly but distinctly longer than the 12th.

## MEGACHILINÆ.

### *Lithurgus? spiniferus*, sp. nov.

Black, the face, temples and pleuræ densely covered with long white hair, the front with long, the vertex with short fuscous pubescence; the metanotum with long pale fuscous hair; the scopa long, dark silvery; the dorsal segments with a narrow band of white pubescence; the last segment above and below

densely covered with rufous hair. Hair on legs long, dense and white, on the hind tarsi rufous; the apices of the 4 hinder tarsi rufous. Wings hyaline, short compared with the body; iridescent, the stigma and nervures black. Female.

Length 12 mm.

Brak Kloof. Mrs. G. White.

Head coarsely punctured, a narrow but distinct keel runs from the ocelli, becoming thicker towards the apex. Face in the centre largely, roundly tuberculate, coarsely rugosely punctured. Mandibles smooth and shining. Mesonotum and scutellum closely, rugosely punctured. Metanotum weakly punctured, smooth in the middle at the apex. Back of abdomen punctured, the punctuation becoming stronger towards the apex; the hair on the pygidium long and dense, covering the sculpture. dark at the base, the rest bright red. Epipygium stoutly, sharply spined in the centre, the sides with shorter and stouter spines, which are placed further back than the central.

*Lithurgus ovatus*, sp. nov.

Black, the inner orbits, front, clypeus, lower outer orbits and pleuræ thickly covered with long silvery white hair; the hair on the legs white, on the tarsi tinged with rufous; scopa white. Wings hyaline, the stigma and nervures black; tegulæ piceous. Female.

Length 9 mm.

Brak Kloof. Mrs. G. White.

Face coarsely, rugosely punctured; the hair on the clypeus very long; the part below the apex of the clypeus fulvous. Front and vertex strongly punctured; much more closely on the former than on the vertex where the punctures are clearly separated. Malar space below roundly trituberculate, the middle one the smaller. Thorax rugosely punctured. Abdomen not much longer than the thorax; the basal segments depressed at the apex; the apical thickly covered with rufo-fulvous hair. Fore-tibiæ irregu-

larly punctured; hinder armed somewhat thickly with short, stout blunt spines. Apical tarsal points rufous. Frontal tubercle smooth and shining; it is followed by 2 keels which have between them a few transverse keels; they are prolonged below the antennæ.

Apart from the other differences this species may be known from *L. spiniferus* by the distinct smooth tubercle on the front.

*Megachile tardula*, sp. nov.

Black, the pubescence white, on the face pale ochraceous, on the mesonotum tinged with fulvous; apical joints of tarsi rufous; the hair on the underside of tarsi tinged with rufous. Wings clear hyaline, the nervures and stigma black.

Length 9 mm.

Brak Kloof. Mrs. G. White.

Apex of abdomen with eight teeth; the central two the larger, stout, the space between rounded at the base, as long as wide, the second smaller and sharper, the outer two shorter and blunter; the third separated from the second by a greater distance than it is from the fourth; outside the fourth is a short, blunt tubercle. Mandibles with two distinct large teeth; the second shorter than the first, and not obliquely pointed like it. Head, pro- and mesothorax closely punctured; the metanotal area finely rugose, opaque; the rest closely punctured, more closely and rugosely in the centre than on the sides. The penultimate segment of the abdomen is thickly covered with long black hair; the last above entirely with white pubescence, as are also the apices of the others. The segments are closely punctured, the apical more strongly and closely than the others. Fore legs not dentate.

*Megachile Whiteana*, sp. nov.

Black; the pubescence on the front, face and clypeus white, on the occiput and back of thorax dark rufous, on the pleuræ and

sternum white, tinged with rufous; the apices of abdominal segments narrowly fringed with white; the scopa bright ferruginous; the hair on the legs white, on the inner side of the tarsi rufous; wings hyaline, slightly tinged with fuscous-violaceous; the nervures and stigma black. Female.

Length 10-11 mm.; breadth 3 mm.

Brak Kloof. Mrs. G. White.

Mandibles 3-dentate; the second gradually narrowed from the base to the apex; the space between it and the apical rounded; the third bluntly rounded; the space between it and the second roundly curved; except on the three ridges on the apical half they are strongly, closely punctured. Clypeus strongly, closely punctured, more widely in the centre, where the punctures run into striæ; the apex is transverse, smooth, depressed, slightly waved in the centre. Front and vertex closely punctured. Pro- and mesothorax closely and strongly punctured. Metanotum alutaceous, the basal area closely striated at the base. Basal two segments of abdomen sparsely, the others closely and more strongly punctured. Apex of tibiæ about one-fourth wider than the base of metatarsus. Tegulæ deep black, shining.

*Megachile spiniscutis*, sp. nov.

Black, strongly and closely punctured all over. The lower part of front, face, clypeus and lower part of outer orbits thickly covered with white pubescence; the basal abdominal segments banded with depressed white pile. Wings hyaline, slightly tinged with fuscous; the stigma and nervures black. Male.

Length nearly 6 mm.

Brak Kloof. Mrs. G. White.

Mandibles bidentate, the second tooth short and bluntly rounded, their base strongly punctured, the lower half more closely than the upper. Metanotum opaque, coarsely alutaceous. Legs covered with white hair; the calcaria rufo-testaceous, the fore tibiæ on the upper side at the apex slightly projecting; the coxæ not spined. Apex of last abdominal segment bluntly rounded, depressed, not incised. On the base of the scutellum at the sides is a stout, curved spine, broad at the base, gradually narrowed towards the apex.

The female is similar; the clypeus is fringed with long rufous hair; the scopa white, tinged slightly with rufous.

This species is very similar to *M. prionsa*; the latter is a narrower, more elongated species, especially as regards the abdomen, which is clearly longer than the head and thorax united; the scutellum is more broadly rounded, and it wants the stout lateral spines; the head is longer, especially behind the eyes, and the second tooth of the mandibles is blunter, more broadly rounded.

*Prosopis quadrilineata*, sp. nov.

Black, a line along the inner orbits, commencing shortly below the ocelli and becoming thicker towards the apex, a slightly narrower line in the centre of the face, a broader line on the hind edge of the pronotum, and a large broad mark on the scutellum, roundly curved at the apex, the base with two broad shallow curves. Wings hyaline, the stigma testaceous, the nervures darker. Female.

Length 6-7 mm.

Brak Kloof. Mrs. G. White.

Shining. Face and clypeus strongly but not closely punctured. The centre of front distinctly raised, closely and strongly punctured, and with a thin keel down the centre; a deep depression, obliquely narrowed towards the apex, before the ocelli. Upper part of pro- and the mesopleuræ closely punctured. Apices of basal three abdominal segments narrowly testaceous; the apical coarsely chagreened. First recurrent nervure received a slightly greater distance from the 1st, than is the 2nd from the 2nd transverse cubital nervure.

*Osmia? capensis*, sp. nov.

Black, thickly covered with long, white hair; the four front tibiæ and tarsi rufous, the tibiæ darker behind; flagellum of antennæ ferruginous below; wings hyaline, with a slight fuscous-violaceous tinge; the stigma testaceous, the costa and nervures blacker.

Length 10 mm.

Cape Town (Rev. J. O'Neil, S.J.).

Face and clypeus strongly punctured, the sides more closely than the centre; the centre of the face only sparsely punctured. Vertex sparsely punctured, the sides closely, distinctly, somewhat obliquely striated, the striæ going on to the front, which is rugosely punctured. Mesonotum shining; closely, but not strongly punctured; the scutellum similarly punctured, more closely on the apical half. Central area of metanotum closely rugose; the rest sparsely but distinctly punctured. Abdomen smooth and shining; the apical segments thickly covered with long rufous hair. Pleuræ rather strongly punctured, the punctures large and irregular, intermixed with fine striæ. The second abscissa of cubitus as long as the third; second transverse cubital nervure oblique and straight in front, the rest roundly curved. In front it is slightly less than the space bounded by the recurrent nervures. The hair on the hind tarsi is more rufous in tint than it is on the others. Tegulæ large, piceous, pale on the outer side.

*Ceratina bicarinata*, sp. nov.

Black, shining, a broad line, rounded in front, transverse above, and of equal width throughout in the centre of the clypeus, tubercles, and a line on the basal half of the anterior tibiæ cream white. Wings fuscous violaceous, the nervures and stigma black. Female.

Length 9 mm.

Grahamstown, February. Misses Daly and Sole.

Vertex sparsely punctured, almost transverse behind; temples longer than the antennal scape, longer than usual, rounded. Ocellar region raised. From the ocelli a deep, clearly defined furrow runs to the antennæ; its basal half much wider than the apex, forming an elongated oval, with obliquely sloped sides; the apical border narrow, furrowed by stout keels; this apical part is clearly raised; its sides obliquely sloped, and coarsely and irregularly punctured. Face coarsely punctured, the sides more closely than the centre; the clypeus smooth, except for some round punctures bordering the white line and on the sides below. Mandibles and labrum impunctate; the latter covered with long white hair, slightly tinged with fulvous. There are three

impressed lines on the basal half of the mesonotum; these are bordered by some punctures; the apical slope closely and strongly punctured. Basal half of scutellum sparsely, the apical closely punctured, as is also the post-scutellum, except narrowly in the centre. Basal area of metanotum coarsely aciculated, opaque, the rest almost smooth. Mesopleuræ coarsely, closely punctured—more finely and closely above. Metapleuræ coarsely aciculated. Basal three segments of abdomen smooth and shining; the others opaque; the fourth closely punctured; the apical two coarsely aciculated.

The head is longer, more quadrate, than it is with any species I have seen. It probably comes close to *C.*, *subquadrata*, Sm., the description of which is very incomplete: *e.g.*, no mention is made of the colouration of the wings nor of a frontal furrow, and the four hind legs were absent.

*Podalarius æthiopicus*, sp. nov.

Black, a stripe below the antennæ, rounded above, transverse below, a similar oblique one on the sides of the face above; the rest of the face, except for an irregular oblique mark bordering the lateral oblique mark, dilated broadly above and with an irregular edge, the lower edge of the upper dilated part triangularly dilated downwards, the labrum, except for a narrow line on the top and sides, and the mandibles except at the apex, pale yellow. Temples and cheeks thickly covered with long white hair; the hair on the front and vertex fuscous. Hair on upper part of thorax pale fulvous, on pleuræ soot-coloured, on breast white; on back of abdomen white, with the apex of the segments piceous, on neutral surface black. The hair on the upper side of the forelegs white on the tibiæ and tarsi, on the rest black or soot-coloured; on the four posterior black. Wings clear hyaline. The nervures and stigma black. Male.

Length 14 mm.

Martindale. Mr. Barnes.

Clypeus strongly but not closely punctured; a smooth, flat keel on the upper two-thirds; the labrum similarly punctured; the centre of the mandibles with some elongated punctures. Tegulæ piceous.

*Habropoda capensis*, Cam.

Brak Kloof. Mrs. G. White.

*Habropoda lata*, sp. nov.

Black; the hair on the head white, on the top of the thorax fuscous, tipped with black, on the scutellum darker coloured, on the pleuræ and breast pale. The abdomen sparsely covered with black hair; the apices of the segments broadly banded with white depressed pile. The hair on the coxæ, femora and base of tibiæ pale, on the rest rufous, the calcaria pale testaceous. Wings hyaline, iridescent, with a fuscous-violaceous tinge, especially towards the apex; the stigma and nervures black, the tegulæ fuscous-black.

Length 11-12 mm.

Glen Lynden. Miss Leppan.

Clypeus closely rugosely punctured, its apex depressed, slightly waved. Thorax, except in the middle of the mesonotum, which is almost smooth, closely and distinctly punctured and in the centre of the scutellum behind; the centre of the metanotum is alutaceous. The apices of the ventral segments are lead coloured; the hair on the basal segments fuscous, on the others fuscous tinged with rufous.

This is a smaller species than *H. capensis*; apart from the difference in colouration, &c., the two may be separated by the difference in the length of the second and third cubital cellules: in *capensis* the second cellule on the lower side is as long as the third: in *lata* it is not much more than half its length; the second cellule, too, being of equal width at top and bottom, while in *capensis* it is clearly longer behind than in front. It is also a broader species compared with the length.

*Anthidium melanosomum*, sp. nov.

Entirely black, except the apical joints of the four front tarsi, which are rufous, the tarsi above thickly covered with pure white pubescence, below with dark rufous; the front with long

broadly rounded, the middle slightly incised; it projects over t metanotum. Apical segment thickly covered with long silve hair. Metatarsus narrower than the tibiæ. Clypeus not very fl Hind ocelli separated from the eyes by a distinctly greater distan than they are from each other.

*Anthidium eurysomum*, sp. nov.

Black, the clypeus, the lower half of the inner orbits broa and mandibles except the teeth, pale yellow; a spot on the ou side of the basal two abdominal segments, narrow lines towa the middle of the third and fourth, a large broader line, transve on the inner side, narrowed towards the outer, and a larger line the outer side of the 5th, lemon-yellow. Four front tarsi whi the fore tibiæ anteriorly testaceous, their apex and that of t middle pair pale testaceous, the apex of the hind tibiæ a testaceous. Wings fuscous-violaceous, with hyaline clouds; t tegulæ black. Female.

Length 7; breadth 3 mm.

Grahamstown. Misses Daly and Sole.

Mandibles tridentate, the apical tooth long and curved, t basal two shorter, broader and bluntly rounded. Apex of clype transverse, its sides rounded. The clypeus and face covered wi long white hair; the front with darker, the vertex and occip with dark fulvous hair. The hair on the top of thorax da fulvous, on the pleuræ white; as is also the case with the hair the ventral surface. Apex of last abdominal segment blunt shortly bidentate, the incision between the two shallow. Apex clypeus broadly rounded, projecting. Hair on legs long and cl white: calcaria pale testaceous. The second recurrent nervure almost interstitial; there is a white line on the apex of t antennal scape below. Metatarsus narrower than tibiæ. The 2 abscissa of radius distinctly shorter than the 1st.

This species agrees closely with *A. crassidens*, but can har be its male, the structural difference between the two being great. The two may be separated thus:—

Mandibular teeth four, the apical not greatly longer and sharper t the others; apex of scutellum with a slight but distinct incisio the middle; second abscissa of radius equal in length to the f ..... *crassider*

Mandibular teeth three, the apical much longer and sharper than the others, apex of scutellum not incised; second abscissa of radius clearly shorter than the first..... ..... ..... . ..... ..... *eurysomum.*

## VESPIDÆ.

*Odynerus Schönlandi*, sp. nov.

Black; a curved line on the top of the clypeus, its apex a mark, broader than long, slightly dilated in the centre above and slightly incised below above the antennæ, a band along the lower side of the eye incision, a small mark behind the top of the eyes, a band on the apex of the pronotum, obliquely dilated to a point in the middle behind, a narrow line along the upper edge of the pronotum, two marks on the apex of the scutellum, rounded on the outer side, gradually narrowed on the inner and the apices of the abdominal segments, yellow, the yellow tinged with rufous especially on the head. Legs yellow, largely tinged with rufous, the coxæ black, the middle marked with yellow, the hind femora for the greater part black; the tarsi and apex of tibiæ rufo-fuscous. Antennæ black above, the scape yellow, the flagellum brownish below. Wings hyaline, tinged with fuscous violaceous. Female.

Length 11 mm.

Brak Kloof. Mrs. G. White.

Clypeus strongly punctured, the punctures long, deep; the apex depressed, roundly incised. Head closely, strongly punctured. Thorax strongly, closely punctured; the pronotum not quite transverse, it is projecting slightly in the middle. Sides of scutellum rather stoutly keeled; the sides of the post-scutellum projecting into stout, bluntly rounded teeth at the base; it has an oblique slope. Sides of metanotum bluntly rounded; the centre depressed, furrowed in the middle. First abdominal segment cup-shaped; there is an oblique, ovoid mark on the sides, attached to the apical

line: it is, as is also the second, closely, distinctly punctured. Tegulæ yellow, rufous in the middle. Mandibles rufous, darker at the apex.

The clypeus near the top is as wide as the total length.

*Odynerus acanthoaspis*, sp. nov.

Black, the clypeus, a large mark above the antennæ, roundly narrowed in the middle above, becoming narrowed towards the apex, a broad line on the lower part of the eye incision, a small mark behind the eyes, a broad band on the hinder edge of the pronotum, continued as a narrow line on the top of the pleuræ: tegulæ, two broad marks on the scutellum, a small mark on the sides of the post-scutellum, a line on the apex of the first abdominal segment, broadly dilated laterally and a narrow line on the apex of the third, yellow tinged with rufous. Legs rufous-yellow, the coxæ black behind, the hind femora tinged with black. Wings hyaline, tinged with fuscous violaceous, the stigma and nervures black. Male.

Length 8 mm.

Brak Kloof. Mrs. G. White.

Clypeus longer than its greatest breadth, coarsely punctured, the apex roundly incised. Front and vertex closely and strongly punctured. Thorax closely and strongly punctured, the apex of post-scutellum smooth and shining; its sides with a stout yellow tooth. Sides of metanotum broadly rounded; its centre aciculated, obscurely punctured. Pro-, meso- and apical half of metapleuræ strongly punctured, the base is aciculated, with scattered punctures on the lower half. The basal three segments closely and strongly punctured, the four apical with the apical half obscurely punctured.

*Odynerus kloofensis*, sp. nov.

Black, the clypeus, a large mark between the antennæ, dilated in the centre above, becoming gradually roundly narrowed to the middle, the lower part of equal width and united to the yellow clypeus, the lower part of the eye incision broadly, a short line behind the eyes above, a band on the pronotum, dilated on the apical inner side, two large, almost united marks on the apex of the scutellum, a small mark on the sides of the post-scutellum, and

The tegulæ yellow, tinged with rufous; the apices of the basal two abdominal segments yellow. The underside of the antennal scape yellow, of the flagellum rufous. The four front legs and the hinder tibiæ and tarsi yellow; the fore femora tinged with fulvous. Wings hyaline, the radial and cubital cellules smoky. Male.

Length 8 mm.

Brak Kloof. Mrs. G. White. February.

Clypeus roundly convex, rather strongly punctured, the length about as long as the greatest width, the apex triangularly incised. Thorax rather strongly punctured. Post-scutellum laterally projecting into stout, blunt yellow teeth. Metanotum broadly rounded. Abdomen rather strongly punctured.

*Odynerus erythrospilus*, sp. nov.

Black, the apex of clypeus (but not always), a small mark on the inner side of the eye incision; a mark, rounded above and below, longer than broad, and with a pedicle below above the antennæ, the under side of the antennal scape, the apex of the pronotum broadly in the centre, the tegulæ and legs rufous; a broad mark on the pronotum on the inner side of the rufous line, two lines on the post-scutellum; the apex of the first abdominal segment, of the 2nd more broadly, the line broadly dilated on the sides, the apex of the third and the centre of the others, yellow; the coxæ, trochanters and the base of the femora narrowly black. Wings hyaline, the radial cellule and the cubital cellules to a less extent fuscous-violaceous. Female.

Length 11-12 mm.

Brak Kloof, Mrs. G. White. Dunbrody, Rev. J. A. O'Neil.

Clypeus as long as its width in the greatest part, the apex transverse; the centre flat, the punctures longish, running into each other at the apex. Front and vertex closely, rugosely punctured. Thorax closely, rugosely punctured, except on the base of the matapleuræ. Scutellum with an oblique slope. Sides of metanotum broadly rounded. First abdominal segment campanulate, strongly punctured, the second closely, but not so strongly punctured, the apex more strongly than the rest.

*Odynerus (Leionotus) tegularis*, sp. nov.

Black ; the clypeus, the base of the pronotum broadly, the band divided by a smooth depression in the middle, its inner edge narrowly and the apices of the abdominal segments broadly, yellow ; the tegulæ much larger than usual, yellow, rufous in the middle. Legs yellow, tinged with rufous, the coxæ black, the hind femora blackish below. Wings hyaline, tinged with fuscous-violaceous. Pronotum transverse, the sides projecting into stout teeth.

Length 8 mm.

Teafontein. December. Miss Leppan.

Clypeus broader than long, sparsely, strongly punctured ; its apex almost transverse. Head strongly rugosely punctured, the punctures in the centre almost running into reticulations. Thorax strongly rugosely punctured ; the metanotum less strongly than the rest and with a smooth V-shaped depression in the centre ; its sides below armed with a longish sharp tooth. Scutellums with an oblique slope. First abdominal segment cup-shaped, with a short, distinct neck at the base ; the second depressed at the base ; the middle of the basal half raised. Antennal spine stout.

*Eumenes rufolineata*, sp. nov.

Black, a curved line on the centre of the clypeus, separating the black from the yellow, the greater part of the basal slope of the pronotum, except for a conical black mark on the centre below, the red extending on to the pleuræ above, and as a thin line along the upper edge to the pleuræ, tegulæ and a narrow line on the apex of the 1st abdominal segment, before the yellow apical line, rufous ; the apical half of clypeus, basal half of mandibles, a narrow line on the apex of the first abdominal segment and one three times its width on the apex of the 2nd, yellow ; the latter line is bordered, obscurely above, more distinctly below, by red. Antennæ black above, the scape yellow below, the flagellum brownish. Legs rufous, the coxæ and femora black above, the hinder femora more broadly than the anterior. Wings hyaline, iridescent, the radial cellule smoky ; the stigma and nervures black. Male.

Length to end of 2nd abdominal segment 7 mm.

Brak Kloof. Mrs. G. White.—Dunbrody. May. Rev. J. A. O'Neil, S.J.

Clypeus pyriform, broadly rounded above, the apex with a distinct incision, which is, if anything, longer than it is wide at the apex. Head and thorax closely and strongly punctured; the metapleuræ coarsely shagreened, the upper part with shallow, round punctures; the apex of metanotum thickly covered with white hair. First abdominal segment stout, broad, narrowed behind the tubercles, which are distinct; it is not so long as the thorax, but longer than the 2nd segment.

Allied to *E. lucasia*, Sauss.; that species is larger, has the petiole longer and thinner, the 2nd segment clearly narrowed at the base as in *Zenthus*, and the temples are only slightly developed; in the present species they are as long as the space between the hind ocelli.

*Synagris intermedia*, sp. nov.

Black, antennæ, clypeus in male, and the 3rd and following segments of the abdomen bright orange, wings fuscous violaceous; palpi 4 and 5-jointed. Female and male.

Length 13-15 mm.

Teafontein. Miss Leppan.—Brak Kloof. Mrs. White.—Glen Lynden. Miss Leppan.

Head and thorax closely, rugosely punctured. Clypeus in female in length as long as its greatest width, pyriform, sparsely punctured, the punctures more distinct near the apex; the dilated top part slightly depressed in the middle: its apex depressed in the middle, transverse, but through the depression the edges project. The basal 3 teeth of the mandibles are sharply separated, they become gradually longer, the 3rd being as long as the basal two united, and the 2nd more than double the length of the 1st. Post-scutellum depressed in the centre, the sides roundly convex. Median segment rugosely reticulated; the sides at the apex with 2 short blunt teeth. First abdominal segment laterally keeled below in male, the keel incised near the apex. The apical one or two joints of the tarsi rufous.

In the male the clypeus does not differ much from the female's, except in colour; it is as wide as long, sparsely punctured; its apex may be, in the middle, transverse or slightly rounded inwardly. The basal two-thirds of the 2nd abdominal segment below, are broadly depressed, the depression rounded at the apex.

Comes close to *S. minuta*, but that has the clypeus in the male clearly longer than its greatest width; and the form of the mandibles is different, these being formed as in *analis*, more than as in *fervida* with which Saussure compares them. Cf. Saussure, Melang. Hymén. ii. pl. 2.

*Synagris calida* L.

Brak Kloof. Mrs. G. White.– Kowie. F. Pym.—Grahamstown. Dr. Penther.

In all the examples I have examined of this species the maxillary palpi are 3-jointed; and those I have mounted in balsalm do not look as if a joint had been broken off.

## SPHEGIDÆ.

*Oxybelus ruficaudis*, sp. nov.

Black, base of mandibles, a line on the hinder edge of the pronotum, tubercles, a somewhat oval oblique mark on the sides of the scutellum at the base, post scutellum, and broad bands on the sides of the basal 4 abdominal segments, pale yellow; the apex of the penultimate abdominal segment, the last entirely, the apex of femora narrowly and the tibæ and tarsi rufous, as are also the tegulæ. Wings hyaline, the nervures and stigma fuscous. Flagellum brownish below. Female.

Length 8 mm.

Grahamstown. February. Misses Daly and Sole.

Scutellar spine twice longer than wide, depresed deeply above, the apex deeply, roundly incised. Scutellum with a narrow, but distinct keel down the centre, sides of post-scutellum rounded outwardly, the apical lateral projection projecting, on the inner

side, into a bluntly rounded tooth ; the centre bearing a large, thin keel, rounded at the base and apex. Apex of clypeus armed with 3 short, bluntly rounded teeth. Metanotal area wide at the base, becoming roundly narrowed towards the apex ; in the centre are 2 stout, parallel keels, with a few transverse ones between ; on either side are a few oblique ones and the apex is closely, coarsely striated. Head, thorax and abdomen coarsely, closely punctured ; the lower part of front, face and clypeus thickly covered with silvery pubescence. Hind tibiæ with the spine stout, long and pale, the tarsal spines being also long and white. Pygidium closely and strongly punctured, the sides distinctly margined.

*Oxybelus capensis.* sp. nov.

Black, antennal seape, the greater part of the mandibles, a line on the apex of pronotum, tubercles, 2 large marks, transverse behind, rounded in front, on the base of the scutellum, post-scutellum, except the spine and large transverse marks on the basal 5 abdominal segments, bright lemon-yellow ; the greater part of the 4 anterior femora, and the tibiæ bright lemon yellow ; the hind tibiæ with a black mark on the outer side in the middle ; the tarsi yellow, tinged with rufous. The pubescence on the front golden, on the rest of the head and body silvery. Wings hyaline, the stigma and nervures dark fuscous. Male.

Length 5 mm.

Brak Kloof. Mrs. G. White.

Head and thorax closely rugosely punctured. Scutellum with a distinct keel down the middle. Sides of post-scutellum roundly curved outwardly, the apex of the lateral projection incised in the middle, the 2 parts bluntly rounded, the inner the larger ; the spine broad at the base, becoming gradually, but not much, wider towards the apex, which is widely incised, the incision wider at the apex than its total length ; it is greatly hollowed, the sides projecting upwards ; it is black to shortly beyond the middle ; the black roundly incised ; the apex yellowish testaceous ; in the centre of the base is a stout yellow spine. The metanotum is bordered laterally by a stout keel ; in the centre are 2 keels which unite in the middle, then run united to the apex ; the space enclosed by them is rugose at the base, the rest smooth and shining ; on its

outer side, at the base, are 2 or 3 irregular areæ united to it; the apical central keel is wider, smooth and shining at the base; there is a shining fovea on either side of it at the apex. The 2nd to 5th abdominal segments project laterally into sharp, narrow blackish spines.

Comes near to *O. spiniferus*, Cam.; the scutellar spine in that species is larger, longer compared with its width, it is raised and keeled in the centre, not hollowed, and the central area of the metanotum is raised and clearly reticulated, while in *capensis* it is finely rugose, with 2 transverse keels above the apical depression.

*Hoplisus Whitei*, sp. nov.

Black, the clypeus, labrum, underside of antennal scape, a line on the hinder edge of the pronotum and of the scutellum and on the apices of the basal 4 abdominal segments, yellow; the apical two abdominal lines narrower than the basal and edged laterally with blood red: the tubercles, tegulæ, the sides of the basal abdominal segment broadly, the apical half of the penultimate and the whole of the last, blood red: legs black, the anterior tibiæ and tarsi, the apex of the middle femora, the greater part of their tibiæ and the apical 4 joints of the middle tarsi, the greater part of the hind coxæ, trochanters, femora and tibiæ below, rufous; the basal joint of the fore tarsi slightly, of the middle distinctly yellowish white, of the hind tarsi for the greater part whitish below; the 2nd and following joints of the hind tarsi black; the base of the 2nd and 3rd white. Wings hyaline, the nervures and stigma black, the radial cellule, the greater part of the 2nd cubital cellule in front smoky: the stigma is paler in the centre. Male.

Length 6 mm.

Brak Kloof. Mrs. G. White.

Antennæ stout, their 5th and 6th joints oblique, produced below: the 3rd is as long as the following two united; the last nearly twice the length of the penultimate. Clypeus covered with silvery pubescence; the pedicle testaceous. The front, except above, smooth; the upper part, and vertex covered with distinct, clearly separated punctures: the front thickly covered with fuscous

pubescence. Hinder ocelli separated from each other by a distinctly greater distance than they are from the eyes. Mesonotum strongly, but not closely punctured ; the scutellum more sparsely punctured, the sides almost smooth in th e centre. Post-scutellum aciculated, sparsely punctured. Metanotal area with some stout, irregular, slightly oblique keels ; the part beyond it smooth, the rest of the segment strongly punctured. Pleuræ sparsely punctured, thickly covered with white pubescence. First abdominal segment almost smooth, the 2nd sparsely, the others more closely and distinctly punctured. The recurrent nervures are received closely to each other, beyond the middle of the cellule. The alar neuration is as in *H. quadrifasciatus* Pz., cf. Kohl, Ann. K.K. Hof Mus. Wien, XI, 415, fig. 66. The central keel on the metanotum is more twisted than the others ; there are about 12 keels. The penultimate joint of the antennæ is hollowed beneath. Comes close to *H. thalia*, Hand. In the male antennæ of that species the 6th joint does not project equally with the 5th as in *Whitei ;* the 7th, too, is clearly narrowed below, while in my species it is of equal width above and below, this being also the case with the 6th, which in *thalia* is distinctly narrower below than above. The basal joints of the antennæ in my species are stouter compared with the apical than they are in *thalia.* Cf. Handlirsch, Ver. Z-B. Ges., Wien, 1901, 428. *Thalia*, too, is a larger species and the cloud in the radial cellule does not reach to the cubitus. The eyes in my species hardly converge below. The striation on the median segment probably varies.

*Tachysphex Schönlandi*, sp. nov.

Black, the basal half of the abdomen red ; the apex of femora, tibiæ and tarsi rufo-testaceous, the spines paler ; the front, face and clypeus thickly covered with golden pubescence ; wings hyaline, the nervures and stigma testaceous. Male.

Length 10 mm.

Grahamstown. Dr. Penther.

Eyes strongly converging above, separated on the top by not much more than half the length of the antennal scape. Basal half of mandibles black, covered with golden pubescence ; the apica

dark red. Mesonotum and scutellum closely and distinctly punctured; their pleuræ more shining and only weakly punctured. Metanotum opaque, coarsely alutaceous, the apical slope irregularly transversely striated; the metapleuræ finely, closely and regularly striated. Penultimate abdominal segment coarsely punctured, the last smooth, bare, transverse at the apex.

*Tachysphex Pentheri*, sp. nov.

Black, the basal two segments of the abdomen red: the apical half of clypeus and labrum yellow, tinged with testaceous; mandibles rufous, yellow at the base; the apex of femora, tibiæ and tarsi rufous; wings hyaline, the nervures and stigma testaceous. Male.

Length 9 mm.

Grahamstown. Dr. Penther.

Front and face thickly covered with silvery pubescence; they are, with the vertex, opaque, closely, finely pnnctured. Vertex furrowed in the middle above; above the ocelli is a reversed U-shaped furrow. Palpi rufo-testaceous. Thorax opaque, covered with white pubescence: the metanotum transversely, the metapleuræ more closely and regularly longitudinally striated. Abdominal segments banded with silvery pubescence: pygidium indistinctly, sparsely, finely punctured; the apical half of epipygidium coarsely punctured. Eyes at the top separated by almost the length of the antennal scape. Tegulæ rufo-testaceous.

## CEROPALIDÆ.

*Microphadnus*, gen. nov.

Cubitus in hind wings originating largely before the transverse median nervure. Transverse median nervure received very shortly behind the transverse basal, almost interstitial. Radial cellule small, narrow, not reaching to the middle of the space between the stigma and apex of the wings: 2nd cubital cellule not quite square, slightly but distinctly, narrowed in front, wider than

long; 1st recurrent nervure interstitial; the 2nd received near the apex of the cellule. Apex of metathorax rounded, not dentate. No tarsal comb. Claws bifid. Mandibles with a long, sharply pointed apical tooth. Prothorax longer than the meso—; its hind edge almost transverse. Tibiæ sparsely, the tarsi thickly spinose.

This genus should readily be known by the cubitus in hind wings originating far behind the transverse median, in the known genera it originates beyond it or is interstitial. The radial cellule is smaller than usual.

*Microphadnus bicolor*, sp. nov.

Black: the tibiæ and base of tarsi dark rufous; palpi fuscous, wings hyaline, the apex from near the 2nd transverse cubital nervure smoky; the stigma and nervures dark fuscous; the 2nd transverse cubital and the 2nd recurrent nervures pale. Female.

Length 5 mm.

Grahamstown Misses Daly and Sole.

Pruinose, the apices of abdominal segments with broad bands of white pile: the mesonotum and scutellum closely, minuteiy punctured. Eyes slightly, but distinctly converging above. Ocelli in a triangle, the hinder separated from each other by the same distance they are from the eyes. Long spur of hind tibiæ half the length of the metatarsus.

*Microphadnus? fuscipennis*, sp. nov.

Black, covered with cinereous pubescence; mandibles piceous; wings fuscous, iridescent, the stigma and nervures black. Male.

Length 7 mm.

Grahamstown. Dr. Penther.

Eyes curved, converging above, separated there by the length of the 2nd, 3rd and 4th antennal joints united. Ocelli in a curve, the hinder separated from each other by a slightly greater length than they are from the eyes. Second cubital cellule on the lower side nearly as long as the radial; the transverse cubital nervures in front obliquely bent towards each other, the cellule being thus narrowed in front; the 1st recurrent nervure is received near the apex of the basal fourth; the 2nd closer to the apex. Tibial spurs long; there are 2 or 3 at the apex of the femora: fore claws with a tooth; the posterior simple.

In this species the radial cellule is slightly and the 2nd cubital cellule distinctly longer than it is in *M. bicolor*, it being clearly longer than wide ; the ocelli are not in a triangle and the recurrent nervures are received further from the transverse cubitals. In the other generic characters they agree. The 3rd and 4th joints of the antennæ are equal in length. If not a *Microphadnus* there is no other genus in which it can be placed. The cubitus in hind wing originating, in the hind wings, behind the transverse median nervure separates it from the known genera of *Aporini*.

*Planiceps ruficaudis*, sp. nov.

Black, the oral region and the 3rd and following segments of the abdomen rufous ; the basal 3 or 4 joints of the antennæ dark rufous beneath ; tarsi for the greater part rufous, their spines black ; calcaria white, the long spur of the hinder two-thirds of the length of the metatarsus ; wings hyaline, suffused with dark fuscous, the stigma and nervures black. Female.

Length 8 mm.

Grahamstown. Dr. Becker.

Antennæ stout, the 3rd joint not much longer than the 4th. Hind ocelli widely separated, separated from each other by 3 times the distance they are from the eyes. Occiput almost transverse. Eyes long ; malar space small, the eyes reaching close to the base of the mandibles. Temples as long as the 2nd antennal joint. Median segment as long as the mesonotum and the scutellum ; its sides at the apex clearly projecting. Pleuræ closely, minutely punctured, thickly covered with silvery pubescence. First recurrent nervure received 3 times the distance from the 1st that the 2nd is from the 3rd, the latter being received close to the 2nd transverse cubital nervure. The abdomen is not quite as long as the mesonotum with the metanotum.

*Pseudagenia kloofensis*, sp. nov.

Black, covered with a cinereous pile, the apex of clypeus broadly, the apex of fore femora and tibiæ narrowly and the greater part of the fore femora below, rufous ; the fore tibiæ in

front and the tarsi fuscous-rufous; wings hyaline, a black cloud on the apex of fore wings, extending from the 3rd transverse cubital nervure and the apex of the radial cellule. Female.

Length 9 mm.

Brak Kloof. Mrs. White. February.

Eyes converging very little above. Hinder ocelli separated from each other by the same distance they are from the eyes. Apex of clypeus broadly rounded. Apex of pronotum arcuate. The 2nd and 3rd cubital cellules in front are equal in length; below the 2nd is the longer. Basal joints of palpi black, the apical dark fuscous.

*Pseudagenia infantula*, Kohl.

This Cameroon species has been taken on the Katberg by Miss Sole. Characteristic is the distinct spine on the apex of the clypeus. Cf. Kohl, Ann. K. K. Hofmus., XI, 1894, 307.

*Pseudagenia capicola*, sp. nov.

Black, covered with a silvery pile; flagellum of antennæ brown; wings clear hyaline, iridescent, stigma fuscous, the nervures black; there is a brownish narrow cloud along both sides of the transverse, median and transverse basal nervures, broader along the latter than the former on the inner side; on the outer side it commences at the cubitus, is of the same width that it is on the inner side; along the transverse median it is narrower and more irregular on the outer than on the inner side. The apical cloud occupies the radial cellule except at the apex: the 2nd cubital cellule except a triangle on the lower inner side, the whole of tne 3rd and a cloud below, broad at the top, roundly narrowed behind, extending from the apex of the 1st recurrent nervure to the 3rd transverse cubital, and backwards to the discoidal nervure on either side of the 2nd recurrent nervure, the inner part being much larger than the outer. Female.

Length 10 mm.

Brak Kloof. Mrs. G. White.

Eyes distinctly converging above, separated there by the length of the 2nd and 3rd antennal joints united. Ocelli in a tri-

angle, the posterior separated from each other by a less distance than they are from the eyes. Pronotum as long as the mesonotum. its apex bluntly angulate; the mesonotum slightly raised in the centre. Metanotum finely, obscurely, transversely striated. Pygidium brown, paler along the apex, densely haired, the hairs issuing from punctures.

The 2nd cubital cellule is distinctly shorter than the 3rd in front and behind and is of the same width at the base and apex, the 1st transverse cubital nervure is oblique. only slightly bent in front; the 2nd is roundly bent outwardly.

Comes near to *P. spilotænia*, Kohl; in that species the cloud occupies the radial and the 2nd cubital cellules entirely and the cloud along the transverse median and basal nervures is wider on the outer than on the inner side, it being also not indented on the lower side.

*Anoplius Leppani*, sp. nov.

Black, the head except for a large black oval mark extending from the middle of the vertex to the antennæ, a broad band on the apex of the pronotum, a square mark on the apex of the mesonotum, and scutellums, reddish yellow, as are also the antennæ and legs except the coxæ, trochanters, the 4 front femora to near the middle and the posterior to near the apex, which are black; wings bright yellowish hyaline, the apex from the 3rd cubital cellule bright fuscous violaceous. Female.

Length 17 mm.

Eyes converging above, separated by the length of the 2nd and 3rd antennal joints united. Apex of clypeus broadly rounded. Labrum entire, fringed with golden hair. Mandibles with the apex broadly black, the base pale testaceous. Apex of pronotum broadly angled in the middle. The 2nd and 3rd cubital cellules almost equal in length in front; the 3rd transverse cubital nervure obliquely sloped towards the 2nd in front; the 2nd roundly curved backwards; the 1st recurrent nervure is received near the base of the apical fourth of the cellule; the 2nd in the middle; transverse basal nervure interstitial; cubitus in hind wings received beyond transverse median. The long spur of the hind tibiæ does not

reach the middle of metatarsus. Fore claws cleft, the others toothed at the base. Metanotum short, rounded. Mandibles bidentate. The last segment of the abdomen is brownish, bluntly rounded. Fore tarsi combed. Scutellums flat.

This species does not fit into any of the genera as defined by Dr. Ashmead. It is to be referred to the group commencing with *Pompilinus*, which has the cubitus in hind wings originating beyond the transverse median. Cf. Canad. Ento. XXXIV, 86.

Glen Lynden, December. Miss Leppan.

*Anoplius vindicatus*, Sm.

What appears to be this species has been taken by Mr. F. Pym at Grahamstown. It does not fit very well into any of the Genera as defined by Dr. Ashmead. The cubitus in hind wings originates far beyond the transverse median ; the transverse median nervure interstitial ; the 1st recurrent nervure is received near the apex of the cellule ; the 2nd transverse cubital nervure is roundly curved backwards ; the long spur of the hind tibiæ reaches to the middle of the metatarsus. Eyes distinctly converging above, separated there by the length of the 4th antennal joint. Apex of clypeus broadly rounded. Apex of pronotum obliquely arcuate, of metanotum broadly rounded. The latter is not striated, it is alutaceous and thickly covered with black hair. There is a narrow rufous line on the hinder orbits. The spines on the outer side of the fore tibiæ and tarsi are long and stiff.

*Anoplius Soleanus*, sp. nov.

Black, covered with cinereous pile, the wings fuscous violaceous, the nervures and stigma black : the 3rd cubital cellule much narrowed in front, about one-third of the length of the 2nd ; transverse median nervure received shortly beyond the transverse basal ; the cubitus in hind wings originating in front of transverse median. Female.

Length 8 mm.

Grahamstown. Misses Daly and Sole. May.

Eyes slightly converging above, separated there by about the length of the third and 4th antennal joints united. Front with a distinct furrow. Ocelli in a broad curve ; the hinder not clearly

visible, through being placed in a depression, at the end of the central part which is raised, the sides beyond the raised central part being depressed. Apex of clypeus broadly rounded; the top clearly separated, and divided into 3 waved parts. Pronotum, if anything, longer than the mesonotum, bluntly arcuate behind. Apex of metanotum almost transverse. Apical abscissa of radius curved roundly upwards; upper half of 3rd transverse cubital nervure obliquely bent backwards; the recurrent nervures received beyond the middle of the cellules, the 2nd nearer the apex than the 1st. Claws with a tooth in the centre.

This species, in Ashmeâd's tables (Can. Ent. XXXIV, 82), would run into *Hypoferreola*, if the 3rd cubital cellule were not so small—in *Hypoferreola* it is "large, not or only sligthly narrowed in front." The temples are very small.

*Anoplius Dalyanus*, sp. nov.

Black, covered with grey pubescence, the abdominal segments broadly banded with the same; wings hyaline, the apex infuscated; 3rd cubital cellule much narrowed in front, about one-fourth of the length of the 2nd; apical abscissa of radius straight, oblique, transverse median nervure received behind the transverse basal; cubitus in hind wings received behind the transverse median. Male.

Length 8 mm.

Grahamstown. Misses Daly and Sole.

Antennæ short and thick; the 3rd and 4th joints about equal in length. Occiput transverse, the temples very short. Eyes slightly converging above; the hind ocelli separated from each other by the same distance they are from the eyes; they are in a curve. Pronotum as long as the mesonotum, almost transverse behind. Metanotum curved, projecting laterally. Claws unequally cleft, the inner shorter than the outer. Tibial and tarsal spines long; the fore tarsi not fringed with long spines; the long spur of the hind tibiæ three-fourths of the length of the metatarsus. First recurrent nervure received shortly before the middle, the second near the base of the apical fourth; the 1st and 3rd transverse cubital nervures roundly curved; the 2nd straight and oblique.

In Ashmead's arrangement this species would run near *Schiztosalius*, but the pronotum is not obtusely or arcuately emarginate as in that genus and in *Sophropompilus*.

*Anoplius (Pompilogastra?) erythrourus, sp. nov.*

Black: the clypeus, face and orbits narrowly dark rufous; the antennæ, apical third of femora, tibiæ and tarsi, reddish yellow: wings yellowish hyaline, the base and apex narrowly smoky; the apical 3 segments of the abdomen dark rufous. Male and female.

Length, male 16, female 22-27 mm.

Brak Kloof. Mrs. G. White.

The 3rd cubital cellule in front about one-fourth shorter than the 2nd; 1st recurrent nervure received not far from the apex of the cellule; the 2nd shortly beyond the middle; transverse median nervure received shortly beyond the transverse basal; the 1st and 2nd transverse cubital nervures straight, oblique, parallel; the 3rd roundly bent towards the 2nd in front; cubitus in hind wings originating before the transverse median nervure. Apex of clypeus slightly roundly incised; the labrum with a wide furrow in the centre, the furrow narrowed above. Head roundly narrowed behind; the eyes slightly converging above, separated there by about the length of the 3rd antennal joint. Hind ocelli separated from each other by the same distance they are from the eyes. Fore tarsi, strongly combed on the outer side, stout, the 2nd joint about one-third the length of the basal; claws with a tooth near the base; in male almost bifid. Sides of mesonotum depressed. Apex of metanotum transverse, with a slightly oblique slope; the base with a shallow longitudinal furrow on the apical half. Tibiæ sparsely, tarsi thickly spinose; the long spur of hind tibiæ one-third of the length of metatarsus.

The head is clearly longer than wide. Mandibles dark rufous, black along the apex. Palpi rufo-testaceous. Apex of pronotum roundly arcuate. The head probably varies considerably in the amount of rufous colour it bears above. In the male the antennæ are stout, short, not much longer than the head and thorax united; their 3rd and 4th joints are equal in length; the 3rd segment of the abdomen is red, not black as in the female.

I am not sure but that this species may be *Pompilus ignitus*, Sm. (Cat. Hym. Brit. Mus. iii, 142) from the "Interior of South Africa." The description of the median segment "rounded" behind, does not fit the transverse apex of my species. The description otherwise is incomplete; the head is said to be entirely ferruginous; but my specimene show variations in its colour: it is black for the greater part in all the specimens.

In Dr. Ashmead's arrangement it comes nearest to *Pompilogastra*, Ashm., the type of which is an American species.

*Pompiliodes Beckeri*, sp. nov.

Black, covered with grey pile, the head thickly with long black hair; the apical two-thirds of hind femora and hind tibiæ red; wings hyaline, highly iridescent, suffused slightly with fuscous; the apex of both wings distinctly clouded, the anterior from the end of the radius; antennal scape yellowish, the basal joints of flagellum brownish below. Male.

Length 9 mm.

Grahamstown. January. Dr. H. Becker.

Eyes converging above, separated there by the length of the 3rd and 4th antennal joints united. Hind ocelli separated from each other by the same length they are from the eyes. Apex of clypeus transverse in the middle. Pronotum not quite so long as the mesonotum. Apex of metanotum truncate, densely covered with dark grey pubescence. Abdominal segments with grey primrose bands, the last segment pale. First recurrent nervure received not far from the apex, the 2nd in the middle of the cellule.

The interstitial transverse basal nervure in fore wings, cubitus in hind, petiolated 3rd cubital cellule, &c., refer this species to *Pompiliodes* as now defined.

*Salius Whiteanus*, sp. nov.

Claws with 1 tooth. Deep black; the head, thorax and apex of abdomen thickly covered with black pubescence; wings fuscous-violaceeus, iridescent, the nervures and stigma black. Male.

Length 12 mm.

Brak Kloof. November. Mrs. G. White.

Head, pro- and mesothorax closely rugosely punctured, the scutellum more sparsely than the mesonotum; the metanotum closely at the base, the rest more widely and strongly transversely striated. Upper part of metapleuræ finely punctured to the longitudinal furrow, which is deep; the lower part finely and closely striated; the apex strongly striated like the metanotum. Eyes hardly converging above; separated there by the length of the basal 3 joints of the flagellum united; the joints are clearly separated; the 3rd is slightly smaller than the 4th. Apex of clypeus broadly transverse; a row of foveæ behind it. Face smooth depressed; a large round fovea at the sides. Hind ocelli separated from each other by a slightly less distance than they are from the eyes. Radial cellule short, the radius roundly curved; 3rd cubital cellule in front shorter than, behind longer than the 2nd; 1st and 3rd transverse cubital nervures obliquely bent in front; 2nd recurrent nervure received in middle of cellule. The fore tarsi are not much longer than the tibiæ, thick; the basal joints thickly and stoutly spinose below; the fore coxæ and femora are broader than usual compared with the posterior and middle. Pronotum as long as the mesonotum. Temples very short. Transverse median nervure received clearly beyond the transverse basal; the cubitus in hind wings in front of transverse median.

*Salius (Mygnimia) Pringleæ*, sp. nov.

Black, shining, especially the abdomen; the head sparsely, the prosternum thickly covered with longer black hair; the flagellum of antennæ orange yellow; wings dark fuscous, with a distinct, uniform blue-violaceous tinge. Female.

Length 25 mm.

Claws with one tooth. Apex of clypeus almost transverse in the centre. Apex of labrum with a small triangular incision. Apical joints of palpi dark testaceous. Ocelli in a triangle. Temples roundly narrowed. Apex of pronotum broadly rounded. Median segment transversely striated, but not closely or strongly;

furrowed down the centre: the apical slope steep, smooth, narrowly furrowed in the centre. Scutellums flat, on a level with the mesonotum. The 2nd recurrent nervure received shortly behind the middle.

This species is identical in colouration with *Anoplius vindicatus*, Sm.

Kokstad. May. Mrs. Pringle.

*Salius (Priocnemis) spilocephalus*, sp. nov.

Black, the antennæ and legs except the coxæ and trochanters reddish yellow; the head, except the centre of the vertex and of the occiput, and the mandibles, except at the apex, rufous. Wings fuscous-violaceous, the nervures and stigma black. Male.

Length 15 mm.

Brak Kloof. Mrs. G. White.

Eyes not much converging above; separated there by the length of the 3rd antennal joint. Ocelli in a triangle, the hinder separated from the eyes by almost double the distance they are from each other. Apex of clypeus broadly rounded laterally, the middle transverse, projecting. Apex of labrum slightly incised in the middle, appearing to be almost bilobate. Median segment longish, obscurely striated, the apex with an oblique, gradual slope. Legs long and slender, the tibiæ and tarsi shortly closely spinose: claws with one tooth: the long spur of the hind tibiæ does not reach to the middle of the metatarsus. Temples broad, roundly narrowed. The 3rd cubital cellule distinctly shorter than the 2nd; 1st recurrent nervure received shortly beyond, the 2nd shortly in front of the middle; the cubitus in hind wings originates shortly behind the middle.

*Salius (Cyphononyx) spilostomus*, sp. nov.

Length 23 mm. Male.

Brak Kloof. Mrs. G. White.

This species agrees in size and colouration with *S. Schönlandi*: the two may be separated thus:

Temples narrow, oblique, the occiput rounded in the middle, 3rd cubital cellule distinctly shorter than the 2nd.

*spilostomus*, sp. nov.

Temples broad, not obliquely narrowed, the occiput transverse in the middle; the 3rd cubital cellule as long as the 2nd.

*Schönlandi*. sp. nov.

Head and thorax velvety, covered with long black hair. Hind ocelli separated from the eyes by double the distance they are from each ether. Eyes distinctly converging below. Metanotum at the base irregularly striated, furrowed in the middle; basal tubercles large, longer than broad. Upper half of 3rd transverse cubital nervure obliquely bent towards the 2nd. Cubitus in hind wings received shortly behind transverse median, almost touching it. The clypeus broadly in the middle and the labrum are dark rufous. Mandibles black.

*Salius (Cyphononyx) Schönlandi*, sp. nov.

Black, the head and thorax velvety, thickly covered with longish black hair, the legs reddish yellow with a golden pubescence; the coxæ, trochanters and base of femora black; the apex of clypeus and labrum dark testaceous; a brownish triangular spot below the antennæ; wings uniformly dark fuscous-violaceous; the 2nd cubital cellule hardly longer than the 3rd; the 2nd recurrent nervure received shortly behind the middle; cubitus in hind wings received shortly behind the transverse median; upper half of 2nd transverse cubital nervure roundly curved towards the apex of the wing, the upper half of 3rd with an oblique slope. Long spur of hind calcaria short, hardly longer than the 2nd tarsal joint. Male.

Length 23 mm.

Grahamstown. Dr. Penther. June.

Eyes above separated by the length of the 2nd and 3rd antennal joints. Ocelli in a curve, the hinder separated from the eyes by nearly twice the distance they are from each other. Apex of clypeus transverse. Metanotum widely, obscurely striated, broadly furrowed down the middle; the basal tubercles large. Basal branch of claws stout, not reaching to the middle of the outer. Temples as long as the antennal scape.

*Salius (Gyphonomyx) erythrostomus*, sp. nov.

Black, the antennal scape, and clypeus ferruginous; the antennal flagellum rufous, darker towards the apex; legs rufous, covered with a golden pile; wings fuscous violaceous. Female.

Length 25 mm.

Brak Kloof. April. Mrs. G. White.

Head smooth, impunctate. Eyes at the top separated by the length of the 2nd and 3rd antennal joints united. Apex of clypeus broadly rounded: the base deeply depressed. The 2nd cubital cellule slightly, but distinctly, longer than the 3rd: the 1st recurrent nervure received near the base of the apical third of the cellule, the 2nd shortly behind the middle: the 1st transverse cubital nervure obliquely bent above, the 3rd from below the middle: transverse median nervure in hind wings interstitial. Claws stout. Basal half of metanotum almost smooth, the apical with stout, clearly separated, more or less curved striæ. Tibial spines short. Long spur of hind calcaria reaching slightly beyond the middle of metatarsus. The transverse median nervure received near the apex of basal third of the cellule. Hind ocelli separated from the eyes by 3 times the distance they are from each other.

Looks like a small specimen of *S. dedjas*, Guér. but, *inter alia*, that species is much larger, and the cubitus in hind wings is received behind the transverse median, not interstitial.

## SCOLIIDÆ.

*Discolia bonæspei*, sp. nov.

Length 37 mm. Female.

Grahamstown. June. Mr. J. Webber.

Black, densely covered with black hair; the flagellum of antennæ rufous below; the spines on the fore tarsi black and red. Wings dark fuscous violaceous, a pale fiery red cloud in the base and apex of the costal cellule; a longish one, roundly curved, in

the first radial cellule, a triangular one in the base of the 1st cubital cellule, a long narrow one along the apex of the 2nd, an irregular one in the base of the discoidal, one along the apex of the hind wings in front: the stigma and nervures black. Base of abdomen broadly rounded, not tuberculate. Temples obliquely narrowed: the occiput straight, oblique.

This species is very close to *D. ruficornis* from which it may be known by the clouds in the wings, by the temples and occiput not being rounded, by the base of abdomen being rounded broadly, not transverse and tuberculate in the middle. The punctuation is as in the common species just mentioned.

## PROCTOTRYPIDÆ.

### SCELIONINI.

*Roena*, gen. nov.

Antennæ 12-jointed, the pedicle twice longer than broad at the apex: it becomes gradulally wider towards the apex: the 1st joint of the flagellum is similarly formed, and fully twice longer than it is wide at the apex: the other joints form a stout club. First segment of abdomen broader than long, clearly separated, roundly convex above, the second in the centre not much more than half the length of the 3rd: its base is bounded by a roundly curved furrow, its sides being longer therefrom than its centre: the 3rd is slightly shorter than the 4th: the 5th longer than the latter. Wings with a distinct submarginal vein: a very short marginal and a short clavate stigmal vein.

The eyes are oval; the malar space is nearly as long as them. Temples wide. Mesonotum without furrows. Scutellums flat, not spined; the apex of the scutellum bordered by a distinct keel. Metanotum with longitudinal keels. Mesonotum and abdomen closely longitudinally striated. Front furrowed below. Ocelli minute. The antennæ originate from a protuberance; the apex of clypeus distinct, transverse sides of metanotum broadly rounded.

Characteristic of this genus are the stoutly clavate antenna flagellum, keeled apex of scutellum and the deep curved crenulated furrow bordering the 2nd abdominal segment. It affinities are probably with *Idris*.

*Roena cariniscutis*, sp. nov.

Black, the tarsi and anterior tibiæ testaceous; the head thorax and base of abdomen covered withh white, glistening longish hair. Wings hyaline, the nervures pale. Female.

Length 3.5 mm.

Head obscurely, closely striated; the longitudinal striæ on the mesonotum and scutellum are intersected by finer transverse ones, which form reticulations. Malar space striated. Abdomen not quite so long as the head and thorax united; the apices of the 2nd and 3rd segments smooth and shining. The metanotum with a strong lens is seen to be closely reticulated.

## ICHNEUMONIDÆ.

### ICHNEUMONINI.

*Ichneumon Leppani*, sp. nov.

Black, the head, the basal two segments of the abdomen, and the basal half of the 3rd rufous, as are also the tibiæ and tarsi and the apex of the femora: wings fuscous-violaceous, the stigma and nervures black. Female.

Length 13-14 mm.

Teafontein. May. Miss Leppan.

Face coarsely punctured, broadly roundly raised in the middle, clearly separated from the sides. Clypeus shining, sparsely punctured. Vertex and upper part of front rugosely punctured: the front excavated, smooth, shining: the middle of the punctured part of vertex slightly projecting into it, the sides rounded. Temples wide, rounded, not much narrowed. Thorax closely, almost rugosely punctured, except the scutellum, which is smooth,

almost impunctate, and not much raised: longer than broad. Metanotum more strongly, rugosely punctured; only the areola is defined; it is open at the base, where the lateral keels are more distinct than they are at the apex, which is transverse; the posterior median area is not defined, Petiole narrow; the post-Petiole clearly separated, strongly punctured; the 2nd segment is closely and distinctly punctured: the gastracoeli transverse, deep. Smooth: the 3rd segment is more weakly punctured, smooth at the apex: the others smooth. Areolet large, 5-angled, slightly narrowed in front: the recurrent nervure is received close to the middle. Transverse median nervure oblique, interstitial; disco-cubital nervure not broken.

*Ichneumon? Schönlandi*, sp. nov.

Black, a large, irregular mark on the face, projecting below into 2 conical points, and, in the centre above, into two shorter, bluntly rounded ones and laterally prolonged along the eyes, the lines becoming gradually narrowed above, the scutellums, 2 short, oblique marks on the apex of the 1st abdominal segment and narrow ones on the apices of the others, the middle lines narrower than the others, yellow. Antennæ rufous, the scape black, yellow below. Apices of mandibles rufous. Head and thorax closely punctured, thickly covered with short fuscous pubescence. Scutellum impunctate. Areola large, broadly roundly narrowed at the base, transverse at the apex, longer than broad; the base of the segment smooth, obliquely depressed. Post-petiole coarsely punctured throughout. Gastracoeli large, longer than wide, smooth. Legs red, with black coxæ and trochanters: the hind femora lined above with black: the hind tibiæ and tarsi are darker coloured. Wings hyaline, slightly suffused with fulvous, the stigma black: areolet half the width in front it is behind, receiving the recurrent nervure beyond the middle. Disco-cubital nervure not broken by a stump of a nervure; transverse median nervure interstitial.

Length 12 mm. Male.

Grahamstown. Dr. Schönland. October.

*Ichneumon? Peringueyi*, sp. nov.

Black, the head, thorax and basal abdominal segment red; the 2nd to 6th segments black, the apex of the 6th and the whole of

the 7th white; the eye orbits narrowly yellow; the legs dar rufo-fuscous, the hinder almost black; wings hyaline, the nervur and stigma black. Female.

Length 7 mm.

Grahamstown. November.

Areola horseshoe-shaped, longer than broad, the apex almo transverse. Spiracles small, oval. Scutellum flat, only slight roundly convex, smooth, shining, the base with a small yello mark on the sides. Abdominal petiole long, slender, the pos petiole closely, longitudinally striated; the 2nd, and to a le extent, the 3rd, closely punctured; the gastro-coeli represented b a striated band, not depressed. Basal and lateral areæ of metan tum almost confluent, the keels being very indistinct. Face close punctured, roundly convex in the middle above. Front and verte very sparsely and indistinctly punctured, the former very litt depressed. Temples short, rounded, the occiput slightly roundl incised. Areolet 5-angled, wide, narrowed in front: disco-cubita nervure angled in the middle, straight, oblique at the base an apex. Transverse basal nervure interstitial. Pleuræ closel punctured.

This is not a typical *Ichneumon* as now limited.

*Ichneumon? lissoaspis*, sp. nov.

Areola large, barrel-shaped, indistinctly closed at the base the only other areæ are the spiracular 3 on the apical slope, an an oval one on the lower part of the metapleuræ. Metathoraci spiracles about 3 times longer than wide, curved. Areolet 4-angled, the nervures touching above. Disco-cubital nervure broken by a stump of a nervure. Scutellum moderately flat, smooth and shining. Abdominal petiole long, the post-petiole finely striated in the centre: the 2nd segment finely closely punctured, the others smooth and shining: the last segment as long as the penultimate, the ovipositor projecting, as long as it. There are 7 dorsal segments: the ventral fold on segments 2 and 3. The abdomen is as long as the head and thorax united: its apex not spotted with white: apex of clypeus broadly rounded, not transverse: labrum hidden. Transverse basal nervure interstitial. Antennæ stout, curled, ringed with white.

Ferruginous, the legs black, the anterior fuscous in front: the antennæ fuscous-black; the 8th to 13th joints white except above; the inner orbits and the outer below, narrowly yellow. Wings hyaline, the stigma fuscous, the nervures black. Female.

Length 7-8 mm.

Dunbrody. June. Under stone by riverside.

Face closely, the clypeus sparsely punctured. Front impunctate: the vertex closely punctured, but not so strongly as the face. Thorax closely punctured, the scutellum impunctate: the metanotum more strongly punctured than the mesonotum, the posterior median area transversely, closely, finely striated. Coxæ closely punctured and covered with white pubescence.

This species does not fit very well into any of the genera of the *Ichneumonini* as now limited.

*Stenichneumon? aethiopicus*, sp. nov.

Black, the 2nd and 3rd segments of the abdomen rufous; the apical yellowish testaceous, legs rufo-fulvous: the coxæ and basal joint of trochanters black: the apex of the hind tibiæ blackish. Antennæ rufo-fulvous, tinged with yellow; a broad line, narrowed above, on the sides of the face, and a broad transverse one on the base of the clypeus, rufous-yellow. Mandibles rufous, black at the base. Wings hyaline, tinged with fulvous; the stigma fulvous; the costa and nervures dark fuscous. Palpi testaceous, rufous at the base. Male.

Length 10 mm.

Brak Kloof. Mrs. G. White.

Head, including the front, strongly, closely, almost rugosely punctured; the face thickly covered with longish white pubescence. Temples obliquely contracted. Thorax closely, strongly punctured; the scutellum roundly convex, more shining and less closely punctured than the mesonotum. Areola large, longer than wide, the apex roundly curved inwardly, the base not very clearly closed, rounded backwards; the basal area bounded by oblique keels: the other areæ are not clearly defined: the apical slope is bounded round the edges by a keel. Post-petiole strongly, but not closely punctured, the sides more closely than the centre: the 2nd and 3rd segments closely and rather strongly punctured, the

others weakly punctured, the apical almost smooth. Gastracoeli deep, widened on the innerside at the base: the innerside with 3 or 4 keels. Ventral fold on segments 2-4. Areolet 5-angled, wide in front, the recurrent nervure received at the base of the apical fourth; transverse median nervure received beyond the transverse basal; disco-cubital nervure not broken by a stump of a nervure. Tarsi closely spinous.

The metanotum is less regularly areolated than usual.

*Pseudamblyteles? erythropus*, sp. nov.

Black, the scape, basal joints of flagellum of antennæ and legs red: all the coxæ and the base of the 4 front trochanters black, the flagellum at the apex brownish below; wings fuscous, violaceous, the nervures and stigma black. Female.

Length 9-10 mm.

Brak Kloof. Mrs. G. White.

Attennæ short, stout, attenuated towards the apex; the scape short and thick. Head closely punctured, the face less closely than the vertex, the clypeus less closely and strongly than the face, smooth at the apex; the lower part of the front deeply excavated, smooth and shining. Scutellum roundly convex, the base shining, with only a few punctures, the apex more strongly punctured, but not closely. Median segment closely rugose, obliquely depressed at the base, the areola large, slightly, but distinctly, longer than wide, the sides straight, slightly converging towards the apex: the base and apex transverse. Post-petiole in the middle closely longitudinally striated, the sides punctured. Gastracoeli transverse, with 2 or 4 stout striæ on the outerside. Apex of abdomen bluntly rounded: the ovipositor projecting, the sheath broad. Areolet wide, 5-angled, receiving the recurrent nervure in the apical fourth: disco-cubital nervure broken by a stump of a nervure; transverse median nervure almost interstitial. Segments 2 and 3 with ventral fold.

Is not quite typical of the genus.

*Spanophatnus, gen. nov.*

Male. Base of metanotum without areæ, the apical slope with a large central and small lateral area: the 2 inner keels are indistinct; the spiracles linear. Scutellum roundly

convex, clearly raised above the mesonotum, broader than long, rounded at base and apex; the sides keeled to near the middle of the apex. Areolet 5-angled, the nervures converging closely in front; recurrent nervure received behind the middle; transverse median nervure interstitial. The petiole becomes gradually wider from the base to the apex, the postpetiole not being clearly defined. Gastracoeli moderately deep. Antennæ shortly, densely pilose, the 3rd joint slightly longer than the 4th. Abdomen with 8 segments. Tarsi not spinose.

The species on which this genus is founded looks more like one of the South African *Cryptina* than an *Ichneumon*. The absence of an areola and clearly defined basal areæ on the metanotum shows also an approach to *Cryptina*; but the absence of pleural and mesonotal furrows separates it from that group.

It comes nearest to *Platylabris*, which has a clearly defined areola and other areæ on the metanotum.

*Spanophatnus ruficeps*, sp. nov.

Head and thorax rufous, a broad band of equal width in the centre of the vertex and front, the occiput except round the edges, the sutures of the thorax and a broad band in the centre of the basal half of the mesonotum black. Abdomen black, the 5th and following segments white, slightly tinged with blue. Four front legs dark rufous, the hind coxæ and trochanters largely black; the femora rufous, black at the apex, the tibiæ and tarsi of a darker red, the former broadly blackish at the apex. Antennal scape red, the rest black, densely covered with short black pile. Wings clear hyaline, the nervures and stigma black.

Length 7-8 mm.

Grahamstown. May. Dr. Schönland.

Head and thorax closely, strongly punctured; the metanotum is more coarsely rugose; the upper part of the metapleuræ at the apex is irregularly reticulated; there is a square black mark in the centre at the base. The basal abdominal segments are aciculated; the apex of the 1st and the base of the 2nd appear to be finely, closely reticulated. The apex of the disco-cubital nervure and the 2nd transverse cubital are largely bullated; the former is angled in the middle.

## HERESIARCHINI.

### *Macrophatnus*, gen. nov.

Metathorax short, with a steep slope behind; areola large, defined all round, slightly longer than broad, transverse at the base and apex, the sides bulging slightly outwardly; from its sides keels run round the sides of the apical slope; another keel runs from the base, inside the spiracles to the apex of the segment. Spiracles large, fully 3 times longer than wide. The whole segment rugose. Scutellum roundly convex, roundly sloped at the base and apex, not keeled. Antennæ stout, tapering towards the apex, about half the length of the body. Apex of clypeus transverse. Face swollen in the middle, but not much. Labrum hidden. Temples wide, slightly obliquely, roundly narrowed. Occiput roundly incised. Malar space as long as the antennal scape. Gastracœli longish, narrow; they are united by a transverse furrow at the base of the segment. Areolet large, 5-angled; the disco-cubital nervure is indistinctly broken; the transverse median nervure is received shortly beyond the transverse median.

The apical keel on the metanotum is dilated in the middle at the sides, forming blunt teeth. The ventral keel is on segments 2 and 3. Tibiæ and tarsi spinose.

### *Macrophatnus rufipes*, sp. nov.

Black, the legs, excert the coxæ and trochanters, and abdomen red; the antennæ of a paler, more testaceous red; the scape yellow in the middle below. The inner orbits yellow from the antennæ, the line becoming wider below, and bordered on the innerside with dark rufous, there being also a rufous mark in the centre of the face. The sides of the clypeus with an oblique yellow mark above; the part between these black; the apex is rufous. Thorax closely and distinctly, the median segment closely rugosely punctured. Apical slope of scutellum and the post-scutellum yellow. Post-petiole strongly, but not closely punctured: there is a transverse yellow mark on the apex. The front ocellus is large, more prominent and brighter-colouerd than the posterior.

CRYPTINA.

*Allophatnus*, gen. nov.

Wings uniformly fuscous-violaceous. Transverse median nervure in hind wings broken shortly, but distinctly below the middle. Radial cellule short. Areolet small, square, the recurrent nervure received at its apex. Transverse median nervure interstitial Scutellum roundly convex, keeled stoutly to the middle. Median segment rugose, with 2 transverse keels and a square area in the middle at the base, the spiracles about four times longer than wide. Petiole long; the apex gradually widened, not separated, the apex about twice the width of the base Apex of clypeus depressed, smooth and shining, transverse, clearly separated. Temples wide, rounded, not narrowed. Tarsi strongly spinose. The disco-cubital nervure is not broken by a stump of a nervure. The 1st and 2nd joints of the flagellum are equal in length.

In Ashmead's arrangement (Bull. U. S. Nat. Mus. xxiii, 43) this genus would run near to *Pyncocryptus*, with which it cannot be confounded The type (I only know the male) is larger, longer than usual. Characteristic are the uniformly fuscous-violaceous wings, with the small square areolet, which is more as in the *Mesostenini* than in the *Cryptini*.

*Allophatnus fulvipes*, sp. nov.

Black, the legs except the coxæ and the basal joint of the hind trochanters bright fulvous red. Wings uniformly fuscous-violaceous, the nervure and stigma black. Male.

Length 17 mm.

Brak Kloof. Mrs. G. White.

Head (except the apex of clypeus) and thorax closely and strongly punctured: the metanotum more rugosely and strongly punctured; the apical slope closely, irregularly reticulated, closely covered with short, black hair. Scutellum more shining, and less closely punctured than the mesonotum, longer than wide, the basal and apical slopes rounded. Abdomen closely punctured, the 1st segment (and more particularly the post-petiole) more coarsely punctured than the rest.

*Cryptus æthiopicus*, sp. nov.

Head, thorax and the sides of the basal two segments of the abdomen rufous; the rest of the abdomen black, with the apical two segments, white above; legs blackish, the anterior testaceous below, the middle tibiæ and tarsi dark fuscous; the hind legs black, their coxæ rufous. Antennæ black, the 5th, 6th and 7th clear white below; wings clear hyaline, the nervures and stigma black. Female.

Length 8-10 mm.; terebra 4 mm.

Museum Grounds. Misses Daly and Sole. September and October.

Vertex finely and closely punctured; the upper part of the front somewhat strongly, transversely striated, the lower part of front deeply excavated. Mesonotum closely punctured, more or less closely reticulated: the furrows crenulated. Scutellum roundly convex, keeled stoutly, laterally to the top of the apical slope: the base smooth, the middle punctured, the apex irregularly longitudinally striated. Metanotum closely, rugosely punctured-reticulated: the apical keel stouter than the basal, ending laterally in stout teeth. Propleuræ closely, slightly, obliquely striated, the upper half more closely and finely than the lower. Mesopleuræ and metapleuræ closely rugose. Abdomen smooth, impunctate, the petiole more shining than the other segments. Areolet 5-angled, narrowed in front, half the width there it is at the apex; the recurrent nervure received shortly beyond the middle; transverse median nervure interstitial.

*Mesostenus leptonotus*, sp. nov.

Black, the thorax rufous, the breast and lowerside of the propleuræ black; the apical 3 segments of abdomen white; the basal five joints of antennæ pale-rufous, the rest black, with a white band in the middle; 4 front legs testaceous, the middle darker than the anterior; their coxæ and trochanters black; hind legs black, the tibiæ dark testaceous; calcaria testaceous. Wings hyaline, the nervures and stigma dark fuscous. Female.

Length 7-8, terebra 2 mm.

Vertex below the ocelli irregularly striated, reticulated. Mesonotum stoutly, transversely striated, the centre of the lobes depressed, smooth, as is also the apex. Scutellum roundly convex, smooth and shining. Base of abdomen behind the keel smooth, with the basal furrow crenulated; the rest stoutly, transversely striated, the striæ roundly curved in places. Propleuræ strongly, closely striated; the meso- closely punctured, the centre with a curved striated depression. Abdominal petiole long, slender, smooth and shining; the middle segments closely punctured, the apices of the basal 3 narrowly testaceous. The abdominal petiole is longer and more slender (especially the post-petiole) than usual, the whole insect, indeed, being more slenderly built than in the typical species. So, too, the parapsidal furrows and the apical depression are deeper and more strongly striated. Areolet square, receiving the recurrent nervure shortly beyond the middle. The transverse median nervure in hind wings broken at the middle. Temples obliquely narrowed. Thorax about 4 times longer than wide.

*Brachyropalum? nigriceps*, sp. nov.

Rufo-luteous, the antennæ, head, trophi and prosternum, black; wings fuscous, iridiscent, the nervures and stigma black. Female.

Length 7, terebra 8-9 mm.

Grahamstown. Misses Daly and Sole.

Face and clypeus, except round the foveæ, closely and strongly punctured; the front and vertex with clearly separated punctures. Apex of clypeus broadly rounded. Malar space fully as long as the eyes. Mesonotum and scutellum sparsely punctured. Metanotum rugosely punctured; an elongated area, narrowed at the base and apex: the sides bordered by a waved keel. Parapsidal furrows, wide, shallow, but deeper and wider round the apex of the middle lobe: the sides at the apex below, widely projecting Abdomen shorter than the thorax, smooth and shining; a waved, shallow, indistinct furrow on the middle of the 2nd segment. Legs densely pilose. Areolet almost square; transverse median nervure received beyond the transverse basal.

*Brachycoryphus? striolatus*, sp. nov.

Dark rufous, the apical half of the 5th and the following segments of the abdomen yellowish-white, the greater part of the occiput, sides of oral region, the greater part of the malar space mandibles broadly at the base, scutellar depression, base of metanotum, the centre of mesosternum, the sides at the base and apex, pleural furrow, base of metapleuræ narrowly, and the lower side broadly, black. Legs darker coloured, the rufous colour of the hind tibiæ and tarsi blackish. Wings clear hyaline, the nervures and stigma black; the areolet small, square, closed, receiving the recurrent nervure at the apex, interstitial. Male.

Length 9 mm.

Capetown.

Face, closely rugose; the sides separated from the centre which is roundly convex. Clypeus somewhat strongly punctured to shortly beyond the middle, the apex smooth. Fore part of vertex rugose, irregularly striated. Temples very short. Occiput transverse. Mesonotum strongly, closely transversely striated: the lateral lobes depressed down the centre. Scutellum smooth at the base, the rest strongly, but not closely, punctured. Base of metanotum closely reticulated; its central area large, narrowed obliquely towards the apex; the rest strongly reticulated, thickly covered with pale pubescence; the teeth prominent, broad, rounded at the apex. Propleuræ irregularly, strongly clearly striated, the top closely rugose, the centre at the base almost smooth, meso- and metapleuræ closely, coarsely rugose, except at the apex above; the metapleuræ are more coarsely rugose than the meso-. First abdominal segment longer than the second; it becomes gradually wider towards the apex; it is strongly punctured, especially at the apex which laterally, is bordered by keels; the 2nd to 4th are closely and strongly punctured, the apical smooth and covered with white pubescence; the last segment bluntly pointed at the apex; longer than the penultimate.

The malar space is as long as the antennal scape. Transverse median nervure received almost behind the tranverse basal. Transverse median nervure angled where it is broken below the middle in the hind wings.

PIMPLINA.

*Pimpla albipalpis*, sp. nov.

Rufous, the head and antennæ black, palpi white; the 4 front legs obscure rufous; the anterior femora white in front, with a white line beyond the middle behind, the line on the femora the larger, the middle tibiæ with a broad white band near the base; the hind coxæ rufous, the rest of the legs black, slightly tinged with rufous; a broad white band near the base, the band as long as the apical black part; wings clear hyaline, the stigma and nervures black. Female.

Length 8 mm; terebra 2 mm.

Grahamstown. August. M. Sole.

Face closely punctured, covered with white pubescence; the clypeus smoother, more shining. Front smooth below, the upper part and sides finely closely striated, the striæ curved roundly. Thorax closely punctured; the upper part of the base of the propleuræ smooth, the rest striated, except at the extreme base. Scutellum roundly convex, sparsely punctured. Metanotum closely rugose, the centre at the base raised, closely, transversely striated; the apical slope smooth, raised in the centre, the sides oblique, the outer edges raised. Abdomen closely punctured, the apices of the segments smooth, narrowly lined with pale yellow; the yellow more distinct on the apical. Only the 3rd segment has a transverse depression; on the base of the 2nd is a deep transverse depression, which is narrowed on the innerside at the base. Stigma narrowly white at the base. Areolet narrowed in front, the nervures almost touching there; angled behind, where the recurrent nervure is received beyond the middle.

*Pimpla brunneiventris*, sp. nov.

Black, a broad band, broadest behind, on the upper edge of pronotum, tegulæ, tubercles, scutellum, and an irregularly oval mark on the apex of the median segment, half on the metanotum, half on the metapleuræ, yellow; the abdomen dark brownish-red; the legs red, the coxæ and trochanters black: wings clear hyaline, the nervures and stigma black, the stigma white at the base. Female.

Length 12; terebra 4 mm.

Grahamstown. Bred from the Cocoon of a Moth.

Face and clypeus closely punctured; the face raised in the centre, the middle of the dilated part smooth. Front and vertex less strongly and regularly punctured than the face; the former transversely striated in the middle and with a keel down the centre. Mesonotum closely, regularly punctured; the parapsidal furrows indicated only at the base. Scutellum only sparsely, weakly punctured. Base of metanotum closely, rugosely transversely striated, the middle almost smooth; the apical slope smooth, except for some irregular reticulations on the sides; the sides have a distinct keel in the centre of the yellow marks. Abdomen closely, uniformly punctured except the apices of the segments which are smooth, as are also the apical two segments. There are no transverse or other depressions. Pleuræ closely punctured, the meta- more rugosely than the meso-; the pro- less strongly and striated in the middle. Areolet oblique. 4-angled; the transverse cubital nervures touching in front; the posterior part distinctly angled where the recurrent nervure is received half way between the middle and apex.

*Lissonota Peringueyi*, sp. nov.

Red, yellow and black; the head, thorax, base of abdomen and the apices of the segments narrowly, yellow; the rest of abdomen red; the centre of the front and vertex, of the occiput more broadly, a broad band on the basal two-thirds in the centre, similar lines on the sides of the apical two-thirds, a narrow line on the apex of the pronotum, the sides of the scutellum, the base

of mesopleuræ narrowly, of the mesosternum more broadly, a line on the upper part of the mesopleuræ, a broader, irregular one on the apex, the sides of the metapleuræ and metanotum on the basal two-thirds, except for a yellow mark, about twice longer than broad, and the sides and base of the 1st abdomen segment at the yellow part, black. Four front legs yellow; the fore trochanters and base of femora marked above with black; the hind legs rufous, tinged with yellow; the coxæ and trochanters yellow; the coxæ broadly black to near the apex on the innerside, more narrowly on the outer to shortly beyond the middle of the base of the trochanters, black. Wings hyaline, the stigma and costa testaceous, the nervures black; there is a large fuscous oval cloud in the centre of the apex: areolet triangular, the pedicle about one half longer than the lower branches which are equal in length. Female.

Length 20 mm.; terebra 10 mm.

Grahamstown. Misses Daly and Sole. March.

Antennæ black, brownish below at the apex, the scape marked with yellow in the middle. Head closely and distinctly punctured, the front and vertex much more closely and strongly than the face: the clypeus smooth. Mandibles and palpi yellow, the teeth black. Thorax strongly, closely and uniformly punctured, except the base of the propleuræ, which is smooth. Abdomen closely and finely punctured; there is a deep pyriform fovea near the apex of the 1st segment. The recurrent nervure is received in the apical third of the cellule.

*Lissonota spilostoma*, sp. nov.

Black, the head, except the centre of the vertex and front, 3 small marks in a curve on the top of the clypeus and the greater part of the vertex, the mesonotum except a large mark, rounded at the apex, in the centre of the basal two-thirds, the sides along the apical two-thirds, the apex in the centre more narrowly, a conical mark on the base of the scutellum, the base, top and apex of mesopleuræ, the basal line conically dilated at the apex below; a large mark on the sides of the median segment at the base, the

inner side broadly rounded, the outer straight, oblique and with an irregularly oval mark in the centre ; the base and apex of the first, the apices of the other abdominal segments and an irregular mark on the sides of the 2nd at the base, yellow. Four front legs, the hind coxæ and trochanters, yellow, the rest of the hind legs fulvous ; a large mark on the innerside of the hind coxæ at the base, a smaller one on the outer and the basal joint of the trochanters, black, wings hyaline, the apex fuscous, the stigma fuscous, the nervures blackish ; the areolet shorter than the pedicle, the basal nervure straight, oblique, the outer roundly curved. Female.

Length 11 mm. ; terebra 7 mm.

Brak Kloof. January. Mrs. G. White.

Head closely and strongly punctured, the face less strongly than the vertex ; the lower part of the front smooth, the clypeus almost smooth. Thorax closely, strongly, uniformly punctured all over. Basal 3 segments of the abdomen closely, distinctly, the 4th weakly punctured, the others smooth.

## BRACONIDÆ.

*Iphiaulax Trimeni*, sp. nov.

Black, smooth and shining ; wings yellowish hyaline ; the fore wings fuscous from the base of the stigma, the hind wings from the middle of the radial cellule ; the stigma orange yellow. Female.

Length 9, terebra 6 mm.

Brak Kloof. Mrs. G. White.

Apical abscissa of radius as long as the other two united. Palpi black, covered with white hair. Abdomen as long as the head and thorax united. Area on 2nd segment smooth, broad at the base, becoming gradually narrowed to a sharp point at the apex ; the lateral furrows deep, straight, oblique ; suturiform articulation crenulated ; the lateral furrows smooth, obliquely curved.

Is very like *I. odontoscapus*, Cam., which species may be known from it by the abdomen being closely longitudinally striated.

*Iphiaulax spilopus*, sp. nov.

Black, the abdomen and hind legs orange-yellow; the 4 front knees and tarsi, except the apical joint and the apex of the basal, pale orange yellow; the apex of the hind tibiæ and of all the tarsal joints black; the wings to the upper half of the transverse median nervure yellowish hyaline, beyond fuscous, the stigma black. Antennæ black. Female.

Length 8, terebra 3 mm.

Grahamstown. Misses Daly and Sole.

Head and thorax smooth and shining. Ocellar region clearly raised, triangular. Temples longer than usual, if anything longer than the front of the head from the end of the eyes; they are not narrowed: the occiput transverse. Mesonotum flat. Scutellum rounded, distinctly raised above. Basal 5 segments of abdomen longitudinally striated, strongly on the basal, more weakly on the apical segments; the suturiform articulation wide, deep; the plate on the 2nd segment small, broader than long. Apical abscissa of radius as long as the basal two united. Antennal scape about 3 times longer than wide, covered with stiff black hair, not hollowed below, nor toothed at the apex. The black bands on the hind legs are broad; on the middle joints of tarsi they occupy more than the half, on the basal almost the half; the apical is entirely black. The middle area of the 1st abdominal segment is triangular, clearly separated, longer than it is wide at the apex.

*Iphiaulax? platynotus*, sp. nov.

Rufo-testaceous, the antennæ, head, hind tibiæ from near the base and the hind tarsi, black; wings smoky fuscous, the 1st cubital cellule, the discoidal cellule below its apex, the extreme base of radial cellule and a cloud on either side of the 2nd transverse cubital nervure, hyaline; the basal two-thirds of the stigma pale ochraceous yellow. Male.

Length 8 mm.

Grahamstown. Misses Daly and Sole.

Temples long, not narrowed, longer than the fore part of the head from the end of the eyes ; the occiput transverse. Antennal scape about 2½ times longer than wide, its apex below projecting into a stout, oblique tooth ; the 2nd joint roundly, broadly projecting below. Mandibles testaceous, their apex black. Mesonotum flat, depressed ; the scutellum also depressed. The raised central part of the 1st abdominal segment raised, striated, the sides flat, smooth, wider than it. The 2nd-5th segments closely, longitudinally striated ; there is no central area or keel on the 2nd segment; the central part is triangular ; the sides depressed, smooth ; the lateral furrows straight, oblique ; on the 3rd segment the lateral furrows are roundly curved, on the 4th short, slightly curved. Legs covered closely with long hair ; the tarsi more thickly with shorter and darker hair ; the apices of their joints spinose ; the fore tarsi long, their basal two joints together as long as the tibiæ.

As in *I. spilopus* here described, the temples in this species are longer than usual, and not narrowed behind the eyes. The whole of the upper part of the thorax is very flat, except that the mesonotum is slightly raised at the base ; the parts behind this are flat, and on one level. The pedicle of the antennæ is stouter and projects downwards more than usual.

The species may belong to *Odontoscapus*, Grib. which was described very briefly from East Africa.

*Meteorus trilineatus*, sp. nov.

Rufo- testaceous, the ocellar region, 3 broad lines on the mesonotum (the anterior almost divided in two), the base of the metanotum, the middle broadly in the centre, the mesopleuræ narrowly above, the meta- more largely at the base, the greater part of the 1st abdominal segment and the 2nd in the middle at the base, black. Antennæ fuscous black. Wings clear hyaline, the nervures and stigma pallid testaceous. Female.

Length 4 mm., terebra 1 mm.

Grahamstown. May. Misses Daly and Sole.

Head and thorax covered with a pale pubescence, closely, minutely punctured; the metanotum at the base closely obscurely reticulated. The dilated apex of petiole finely, closely, longitudinally striated; it becomes gradually widened towards the apex and bears tracheal grooves. The recurrent nervure is interstitial; the 2nd cubital cellule is of almost equal width. In length the petiole is about 3 times longer than its width at the apex. Scutellar depression wide, of almost equal width, deep, an indistinct keel in the centre. Head hardly so wide as the thorax, the temples roundly contracted.

*Rhogas capensis*, sp. nov.

Rufo-testaceous, the antennæ, ocellar space—the mark square—the tarsi and the hind tibiæ, black; wings clear hyaline, iridescent, the stigma and nervures black. Male.

Length 9 mm.

Grahamstown. October. Misses Daly and Sole.

Thorax finely, closely rugose: the mesopleuræ distinctly punctured. Parapsidal furrows wide; the middle lobe of mesonotum clearly separated; the apex of the mesonotum depressed. Scutellum roundly convex, narrowed towards the apex. Metanotum irregularly wrinkled; a keel down the middle; the apical slope is closely, irregularly reticulated. Abdomen irregularly, longitudinally striated; the basal two segments keeled down the centre. The 2nd cubital cellule is almost square, the transverse cubital nervures parallel, not converging; the first is pale at the bottom: the 2nd pale except at the top and bottom. The middle tibiæ are infuscated.

## EVANIIDÆ.

*Evania Schönlandi*, sp. nov.

Black, the flagellum of antennæ, the apex of femora, tibiæ and tarsi testaceous, the tarsi darker coloured than the tibiæ; wings clear hyaline, the nervures and stigma black, the cubitus and radius paler-coloured. Male.

Length 4 mm.

Teafontein. Miss Leppan.

Head smooth and shining; two furrows run from the antennæ to the mouth; they are straight and parallel; below they curl inwardly slightly. Mandibles rufo-testaceous in the middle. Ocelli separated from each other by a distinctly less distance than they are from the eyes. Third antennal joint fully 3 times the length of the pedicle, and shortly (about one fourth) longer than the fourth; the last joint is compressed, thinner and laterally clearly separated from the penultimate and longer than it. Malar space large, as long as the 3rd antennal joint. Mesonotum and scutellum smooth and shining; the parapsidal furrows deep; metanotum not so shining at the base; the rest of the segment closely, irregularly reticulated. Upper half of mesopleuræ smooth, the lower irregularly reticulated—less strongly than the metapleuræ. Lower part of propleuræ obscurely striated at the base. Metasternal process bifid at the apex; the branches short, about one fourth the length of the keel, roundly curved; the keel itself is narrow. The transverse median nervure is received distinctly beyond the transverse basal; the recurrent nervure near the base of the 2nd cubital cellule.

The median cellule is not confluent with the cubital; being separated from it by an oblique nervure before the stigma, closing the cubital cellule behind. It is therefore an *Evania sensu str.*, but it differs from the typical species in the transverse basal nervure being received at a distance from the stigma, not touching it as usual.

The sternal keel is longer, with the forks shorter and more rounded than usual. The 2 apical abscissæ of the radius are paler than the basal, broadly rounded at their junction. Abdominal petiole smooth and shining. Tibiæ and tarsi with a few weak spines. The long spur of the hind tibiæ is about two-thirds of the length of the metatarsus.

This species should, *inter alia*, be known by the short, roundly curved forks of the sternal process, by the transverse cubital nervure being received at a distance behind the stigma, and by the compressed apical joint of the antennæ.

## On some new Genera and Species of Hymenoptera collected by the Revd. J. A. O'Neil, S.J., chiefly at Dunbrody, Cape Colony.

By P. Cameron.

This paper is in continuation of my "Descriptions of New Genera and Species of Hymenoptera from Dunbrody, Cape Colony," published in the *Records of the Albany Museum*, i. No. iii., pp 125-160. The specimens come from Dunbrody, unless another locality is mentioned.

### ICHNEUMONIDÆ.

*Ichneumon? Johannis*, sp. nov.

Black, the thorax red, the centre of metanotum, lower part of pleuræ (the lower half of the meta-) and the breast black: the face, clypeus, labrum, orbits narrowly, a narrow line on the upper edge of the pronotum, tubercles, a narrow line on the sides of the scutellum, its keels, post-scutellum, a small mark on the sides of the metanotum at the base, a larger mark, transverse on the inner, roundly narrowed on the outer side, and longer than broad, on the sides of the apex whitish yellow. Abdomen black; the apex of the basal 3 segments, and of the 5th narrowly, and the whole of the apical two, whitish yellow. Four front legs whitish yellow, their femora and tibiæ fuscous and black behind: hind legs black, the spurs yellow. Wings hyaline, the stigma and nervures black. Antennal scape black, yellow below: the flagellum fuscous, black on top; they are short, thick, serrate. Male.

Length 10-11 mm.

Closely punctured, covered with short white pubescence. Scutellum roundly convex, keeled to near the apex. Areola coffin-shaped, fully twice longer than wide, open behind; the basal, lateral and middle lateral areas separated. Post-petiole slightly aciculated and with scattered punctures.

This species does not fit into any of the subgenera of *Ichneumon*. Characteristic are the keeled scutellum and the long coffin-shaped areola.

*Lienella*, gen. nov.

Male. First transverse cubitus short, not much more than twice longer than thick: the 2nd entirely absent. First joint of flagellum fully longer than the second; the antennæ have at least 19 joints. Eyes large, parallel, not converging above or below: only the ocelli project above them; the hind ocelli are separated from the eyes by more than half the distance they are from each other. Malar space nearly as long as the antennal scape. Metanotum regularly areolated, the areæ large, distinct; the base smooth, depressed, bounded behind by a keel; the spiracles small, roundish-oval. Face thickly covered with long white hair; the clypeus distinct from it, more convex.

The discoidal cellule is closed at the apex; the transverse median nervure in hind wings angled below the middle, almost unbroken, the longitudinal nervure being almost obliterated, the radius and cubitus being also very faint. Legs normal, longish. Parapsidal furrows not reaching to the apex of mesonotum, but beyond the middle; the middle lobe furrowed down the middle; anal valves large, prominent. Clypeus projecting, rounded at the apex, hiding somewhat the mandibles, which have 2 unequal teeth. Discoidal cellule closed at the apex. Basal abscissa of radius more than half the length of the second. Postpetiole bi-carinate.

This genus of *Hemitelini* comes close to *Allocota* and *Alastoneura*, which may be known by the 1st transverse cubitus being entirely wanting, the disco-cubital nervure being interstitial with the radius, while here they are clearly separated, although the transverse cubitus is very short.

the transverse basal. Transverse median nervure in hind wing broken far below the middle. Basal 3 segments of abdome closely, strongly, longitudinally striated ; their centre with a trans verse, broad furrow, the second having at the base, on the sides, transverse one ; the furrow on the 2nd segment is deeper an more clearly defined than it is on the other two. Ovipositor pro jecting, short. Median segment with one transverse furrow ; th spiracles small, round. Eyes large, parallel, not converging Malar space moderate. Hind ocelli separated from the eyes by less distance than they are from each other. Parapsidal furrow shallow, wide, not extending much beyond the middle. Antenn 25-jointed, the basal 2 joints of flagellum equal in length. Fac separated from the clypeus. densely covered with longish, whit pubescence.

The absence of areæ on the median segment separates thi genus from the normal *Hemitelini* ; but there is one genus withou areæ in the group. Its neuration is similar to *Lienella* her described ; but the form of the abdomen, with its deep transvers furrows and the strongly striated basal segments of the abdomei separates it from all known *Cryptina*. The form of the abdomei reminds one strongly of the Braconid genus *Iphiaulax*.

*Caenoaulax striatus*, sp. nov.

Black, the thorax rufous, the abdomen of a darker rufo colour, the apical 3 segments white. Legs black ; the apex of t fore femora, tibiæ and tarsi testaceous, a white band near the b of the hind tibiæ. Wings clear hyaline, the nervures and stig black. Female.

Length 6, terebra 1 mm.

Grahamstown.

Thickly covered with white pubescence. Vertex and u part of front coarsely, rugosely punctured ; the lower pa front striated ; the vertex behind the ocelli on the sides stro obliquely striated. Mandibles rufous, black at the apex. long and yellow. Mesonotum strongly transversely striated furrows wide, crenulated ; there is a narrow furrow on the r lobe. Scutellum raised, rounded, rugosely punctured, th

keeled on the basal half. Metanotum finely rugose, the transverse keel directed obliquely backwards in the middle; there are 2 irregular keels on the outer edge of the outer slope. First abdominal segment roundly curved; the striæ commence near the base; it is broader at the base than it is in the other genera; the striæ become weaker towards the apical segments; the apical 3 segments are smooth; the basal are longer than broad; the 3rd is produced bluntly at the apex below. Pleuræ closely, finely rugose; the apex of the pro- striated. Antennæ not quite so long as the body; the scape rufous.

*Mesostenus basimacula*, sp. nov.

Black, the thorax, except the breast, red, the lower edge of the mesopleuræ and of the metapleuræ more broadly, black, as is also the basal half of the propleuræ; a conical mark (the broad end above) in the centre of the face, extending from the top to the bottom, the upper half of the clypeus, a short line in the centre of the inner orbits and the palpi, pale yellow, a broad black band of equal width on the base of the metanotum; a mark on the sides of the second abdominal segment and the whole of the sixth and seventh yellowish white. Legs black, the anterior in front, the apical half of the middle femora below, the middle tibiæ behind, the base of the hind tibæ all round and the calcaria, white. Wings hyaline, the nervures and stigma black. Male.

Length 7 mm.

February.

Vertex below the ocelli strongly, obliquely striated. Face closely rugosely, the clypeus sparsely punctured. Middle lobe of mesonotum closely, strongly punctured, its apex irregularly reticulated; the lateral irregularly transversely striated, the apex on the innerside punctured. Scutellar depression large, deep, stoutly closely striated. Scutellum shining, sparsely punctured along the sides. Base of metanotum smooth, the rest rather strongly and closely reticulated. Propleuræ strongly irregularly striated. Mesopleuræ closely, coarsely punctured, the upper part at the base and the lower at the apex striated. Metapleuræ

rugosely punctured, more or less striated and reticulated. Post-petiole covered with elongated punctures which run into striæ in the centre; the sides irregularly reticulated. The abdominal segments 2-5 closely punctured. Areolet small, square. Hind coxæ closely, rugosely punctured.

*Mesostenus mimeticus*, sp. nov.

Rufous, the abdomen darker coloured, the fourth and following segments white, flagellum of antennæ black, a band of four white joints in the middle. Legs black, more or less brownish in front, the fore tibiæ white anteriorly, spurs white, wings hyaline, the nervures and stigma black. Female.

Length 9 mm.; terebra 2 mm.

Head closely, rugosely punctured; the front depressed in the centre, strongly, closely transversely striated; the sides smooth; clypeus more shining and more sparsely punctured. Basal half of mandibles reddish yellow. Mesonotum closely strongly transversely striated; the centre at the apex. Metanotal area not very distinctly defined; basal transverse keel distinct, the apical indistinct, especially laterally, the part behind the keel closely rugose; the apical part more coarsely, rugosely reticulated. Propleuræ rugosely punctured above, the rest rather strongly, but not closely obliquely striated. Mesopleuræ closely rugose, the base coarsely irregularly obliquely striated. Metapleuræ coarsely, irregularly, obliquely striated. Post petiole coarsely longitudinally punctured, the sides more coarsely than the centre. The second and third segments are closely strongly punctured. The under side of the thorax is black.

The type of colouration of this species is common in South Africa in the *Cryptinæ* and *Pimplinæ*. It is very similar to *M. O'Neili*, Cam., but that species has not the mesonotum or any part of the thorax striated; and its ovipositor too is much longer.

*Nototrachus flavomaculatus*, sp. nov.

Rufo-testaceous, the face, clypeus, mandibles, except the teeth, palpi, orbits, prothorax, except near the apex of the propleurae, 2 lines on mesonotum, dilated on the outerside at the

apex, a line at the tegulæ, scutellums, the apical slope of metanotum, a line in the centre at the base, the greater part of the mesopleurae, and the base narrowly above and the apex more broadly below, yellow. Legs coloured like the body, the 4 front coxæ and trochanters yellow. Wings clear hyaline, the nervures and stigma black. Female.

Length 8-9, terebra 4 mm.

February.

Head smooth and shining; the front transversely striated in the middle, keeled down the centre. Mesonotum strongly, irregularly, transversely striated, the sides distinctly punctured. Scutellum roundly convex, the sides keeled at the base; it is reticulated, with 2 short stout keels in the apex in the middle. Post-petiole keeled at the sides and apex; the depression at its sides strongly, closely striated. The base of the metanotum behind the keel with scattered punctures; the rest of the segment reticulated. Propleuræ, except at the apex above, closely, strongly striated, the striæ curved; the meso- rugose, striated round the smooth apical part; metapleuræ coarsely, irregularly reticulated. Antennæ black, rufous at the base. Apical half of 1st abdominal segment dilated, smooth and shining: the other segments blackish above; on the apex of the 1st are some stout striæ.

*Lissonota interstitialis*, sp. nov.

Black, the abdomen red, the apices of the basal two segments narrowly edged with yellow; the orbits (the outer more narrowly than the inner), the face, clypeus, mandibles, except at the apex and palpi, yellow; there is a black line down the middle of the face, which curves, more broadly round the top of the clypeus, a line on the pronotum, angularly turned downwards at the base, a curved line in the centre of the mesopleuræ, commencing near the base, and extending to the apex, 2 lines on the mesonotum dilated outwardly at the base, curved slightly inwardly and dilated at the apex, a broad curved line on the apex of the mesonotum, dilated backwards in the middle, a short line under the hind wings, and an ovate one on the apex of the metapleuræ in the centre, yellow. Legs rufous, the 4 anterior in front and their coxæ and trochanters

yellow ; the hind coxæ and trochanters black ; hind tarsi blackish. Wings hyaline, the apex narrowly smoky ; areolet with a long pedicle ; the recurrent nervure interstitial with the 2nd transverse cubital. Female.

Length 11 mm. ; terebra 6 mm.

December.

Front and vertex rather strongly punctured, the face less strongly, the clypeus only sparsely. Thorax strongly and closely punctured, the metanotum more rugosely than the rest. Abdomen smooth.

## BRACONIDÆ.

*Iphiaulax ornaticollis*, sp. nov.

Black, a spot on the malar space, the upper part of the propleuræ and a spot on the apex, orange yellow; wings yellowish-orange hyaline, to the end of the stigma ; the stigma and nervures similarly coloured, the former with a black spot at the base ; beyond the stigma dark fuscous ; hind wings similarly coloured, the dark part commencing near the apical third. Female.

Length 13 mm. ; terebra 2 mm.

Grahamstown. April. On Acacia.

Smooth and shining, except the face which is finely, closely punctured ; the face with a deep longitudinal furrow on the apical half. Clypeus irregularly rugose. Antennal scape short, covered with longish black hair. Abdomen as long as the head and thorax united, smooth (including the furrows), impunctate, shining. The 1st segment is bluntly keeled on the basal half in the centre. The area on the 2nd segment is triangular, the sides slightly curved, its length slightly more than the width at the base ; the bordering furrows wide, shallow ; on the sides is a deep furrow, roundly curved inwardly, the suturiform articulation, oblique laterally, straight, narrowed in the centre. Head cubital, the temples not narrowed, the occiput transverse.

Head, pro- and mesonotum smooth, shining, with some longish black hairs. Basal 3 joints of flagellum about as long as the pedicle, which is narrowed at the base. Metanotum finely transversely rugose ; the lateral central keels converge slightly at the base. Mesopleuræ with a round fovea in the centre ; the meta- finely, closely obliquely aciculated, opaque. Abdomen shorter than the thorax, acutely pointed at the apex ; the ovipositor shortly projecting.

## SPHEGIDÆ.

### *Ampulex capensis*, sp. nov.

Head and thorax dark purple, the metanotum tinged with indigo blue, the pleuræ dark blue ; the abdomen blue, the apical segments testaceous, the mandibles bright rufous. Wings hyaline, the radial cellule, the apex of the 1st, the 2nd cubital cellule, and a cloud beyond it dark fuscous.

Length 13 mm.

February.

Head coarsely, rugosely punctured. Eyes converging above, separated there by the length of the pedicle and following joint united. Hind ocelli separated from the eyes by the length of the penultimate antennal joint. Frontal keels clearly diverging above. Apex of clypeus with 2 stout teeth on either side of the apex, the outer slightly stouter than the inner. Temples roundly narrowed. Pronotum not much longer than its width at the apex, its base without a distinct neck ; closely rugosely punctured ; the mesonotum less closely and strongly all over and the scutellum still less closely and strongly punctured, its middle being almost smooth. Central area of metanotum stoutly irregularly striated, the basal striæ more oblique and regular than the apical ; the 2nd area closely, stoutly obliquely striated, the 3rd reticulated ; the apical slope closely, stoutly, irregularly reticulated all over ; the teeth short and broad. Pleuræ closely and strongly punctured. Head

and thorax thickly covered with long black hair. Basal segment of abdomen large, the apical part more than half the length of the 2nd, which is about one-third longer than its width at the apex; it does not project much in the middle; below its base projects straight down from the first, somewhat as in *A. cognata*, Kohl, and *A. latifrons*. Cf. Kohl's figures pl. xii, f. 34 and 43, Ann. K.K. Hof Mus. viii. The 2nd cubital cellule is clearly shorter than the length of the 2nd transverse cubital nervure. Fourth tarsal joint not much shorter than the 3rd, largely dilated towards the apex.

Comes near to *A. cyanura*, Kohl, in Kohl's system.

*Ampulex spiloptera* sp. nov.

Violaceous, slightly tinged with blue; the centre of mesonotum, scutellum and the 3rd and following segments of the abdomen black, the mandibles and the antennal scape, except above, rufous; the 4 front tarsi testaceous, the posterior fuscous; wings hyaline, a fuscous cloud along the transverse median and transverse basal nervures, the radial cellule and a broad cloud of almost its width extending from it to the opposite side of the wings and the apex of the hind wings dark fuscous; legs, except the tarsi, black. Flagellum of antennæ black. Female.

Length 15 mm.

Third transverse cubital nervure received two-thirds of the length of the transverse cubital nervure from the apex of the radius, as in *A. laevigata* Kohl. Cf. Kohl. Annal. K.K. Hofmus VIII. Taf. XI; f. 15. 2nd cubital cellule in front less than the length of the transverse cubital nervures; somewhat wider behind than in front; 2nd recurrent nervure received at the apex of the basal fourth of the cellule. Head closely and strongly punctured; the temples roundly narrowed behind. Frontal keels stout, commencing shortly behind the middle, parallel, not converging, straight. Hind ocelli separated by the length of the 4th antennal joint from the eyes. Apex of clypeus with a stout, longish, straight tooth on either side of the apex; outside this and clearly separated is a short, broader oblique one. Pronotum clearly longer than its width at the apex; its base with

an oblique slope, the apex in the centre produced into a conical protuberance; the basal slope is longer than the apex, straight, oblique; the apical slope is oblique and much steeper and shorter; it is sparsely punctured; the base deeply furrowed to near the middle in the centre; the apical protuberance is smooth and black above; on the sides below are some curved furrows. Mesonotum sparsely, deeply punctured; the scutellum almost impunctate. Metanotum closely, transversely striated; the sides at the apex project into long, sharply-pointed teeth, which are about one-half longer than the base, and obliquely pointed; the 4 outer keels are parallel and separated by the same width from the base to the apex; the 2nd does not reach much beyond the middle. Propleuræ sparsely and weakly punctured and with a striated band below; the meso- much more strongly and uniformly punctured; the meta- irregularly reticulated above, the apex below with 5 stout curved keels. The apical slope is stoutly reticulated all over: it has a steep slope. Apex of 1st abdominal segment large, fully two-thirds of the length of the 2nd which is as long as the 1st with the narrowed basal part; they are smooth, impunctate. Base of 2nd ventral segment broadly rounded at the base. The 1st joint of flagellum almost twice the length of the 2nd. Penultimate joint of tarsi half the length of the 3rd and last.

In Kohl's arrangement this species would come in near *A. lazulina*, Kohl and *A. spectabilis*, Kohl.

*Ampulex africana*, sp. nov.

Dark green, the lower part of the vertex, front and the pleuræ dark blue, the antennæ and mandibles black; legs dark blue. mixed with green, the tibiæ in front and the tarsi black, wings hyaline, the radial cellule, the 2nd cubital and a cloud beyond it light fuscous; the 2nd abscissa of radius slightly longer than the 1st transverse cubital; the 2nd cubital cellule slightly narrower in front than behind; the 3rd transverse cubital nervure received at a distance from the apex of the radius—the length of the transverse cubital nervures; the 2nd recurrent nervure received near the apex of the basal third of the cellule. Metanotal spines short, conical. Male.

slightly, but distinctly fuscous, with a slight violaceous tinge, the apex and hind wings clear hyaline, the nervures and stigma black. Male.

Length 9-10 mm.

Front and vertex closely punctured, the upper part furrowed down the centre. Clypeus closely, strongly punctured, obliquely sloped at base and apex, the centre being raised; the apical part becomes gradually narrowed to a point. Mesonotum closely punctured, the apex more sparsely in the middle; the sides and apex of scutellum somewhat closely punctured. Metanotum closely reticulated, except in the centre; the apical slope much more closely and regularly reticulated. Pro- and mesopleuræ closely punctured; the latter more strongly and not so closely as the former. Metapleuræ closely reticulated, the base not so closely as the apex. Abdomen obscurely punctured; pygidium shagreened, with 3 foveæ along the sides; these become successively larger, the apical being also shallower. Hypopygium with a large oval depression in the centre. Radial cellule as long as the space bounded by the 1st and 3rd transverse cubital nervures.

*Astata fuscistigma*, sp. nov.

Black, the apical half of the 1st, 2nd and 3rd abdominal segments red; the head, thorax, base of abdomen, and to a less extent, the ventral surface, densely covered with longish white hair; wings hyaline, the stigma testaceous, the nervures and costa black. Metanotum closely longitudinally striated, with some finer, very irregular transverse striæ; the apical slope almost smooth on the sides, the centre with some striæ minutely broken up. Front and vertex closely, minutely punctured, the face and clypeus shining, almost smooth. A broad dark rufous band behind the apex of the mandibles. Mesonotum closely and distinctly punctured, less closely and more shining in the middle near the apex. Basal half of scutellum and its centre impunctate, the sides of the apex punctured; the centre of the apical half with a fine longitudinal furrow. Propleuræ very closely punctured; opaque, thickly covered with long white hair; mesonotum more shining, less pilose and much strongly and less closely punctured; the longitudinal furrow in its centre clearly defined, deep. Meta-

pleuræ closely, irregularly, strongly, obliquely striated. Abdomen smooth; the epipygium at the apex transverse, the hypopygium rounded. Radial cellule as long as the space bounded by the 1st and 3rd transverse cubital nervures. Male.

Length 12-13 mm.

February.

This species agrees closely with *A. boops*, which may be known from it by the much more strongly reticulated metanotum, the transverse keels being distinct and form, with the longitudinal ones, more or less regular areæ; the apical slope is more regularly reticulated, the metapleuræ much more regularly and strongly reticulated, the wings not clear hyaline, and the radial cellule is clearly shorter than the space bounded by the 1st and 3rd transverse cubital nervures.

*Crabro erythrotoma*, sp. nov.

Black, the basal 5 joints of the flagellum, pronotum broadly behind, tubercles, tegulæ, mandibles except at the apex and apical segment of the abdomen, red; the antennal scape, post-scutellum, a mark on the 1st abdominal segment commencing near the middle, dilated more broadly inwardly at the apex, a large mark, 3 times broader than long, on the 3rd, and the apical half of the 5th, yellow. Two front legs red, their coxæ black; middle legs red, the coxæ, base of trochanters, femora to near the apex above and the tarsi black, the trochanters yellow below; hind legs black, the tibiæ dark red, the trochanters yellow below. Wings hyaline, the nervures and stigma black. Female.

Length 10 mm.

Face and clypeus thickly covered with silvery pubescence, apex of clypeus bluntly, shortly trituberculate in the middle. Mandibles bidentate, the upper tooth longer, sharper, and not so broad as the lower. Front and vertex closely punctured, the former covered with golden pubescence. Mesonotum opaque, alutaceous, the scutellum more shining, closely, but not strongly punctured. Metanotal area shining, aciculated, the centre with 2 keels; the space between with transverse keels, all clearly separated; the rest is minutely punctured, and thickly covered with white hair. Pleuræ smooth. Basal segment of abdomen about

3 times longer than it is wide at the apex, nearly as long as the 2nd and 3rd segments united. Apical segment sparsely, but distinctly, punctured above and on the sides, the top clearly margined laterally. Radial cellule short, reaching half way between the stigma and the apex; the apical abscissa of radius straight, not oblique, transverse cubital nervure received in the middle of the radial cellule; the transverse discoidal shortly, but clearly beyond the middle.

Has the form of a *Dasyproctus*, but the petiole is not quite so long as it is in that group, and in it the mandibles are tridentate.

*Trypoxylon capense*, sp. nov.

Black, the mandibles rufous, the palpi pale testaceous; wings hyaline, the apex narrowly clouded, the stigma and nervures black. Face, clypeus and pleuræ thickly covered with silvery pubescence. Front opaque, obscurely striated; from the upper part of the eye incision it becomes gradually narrowed to a point at the apex, but is not keeled; in the centre is a furrow which is more distinct above than below. Eyes slightly converging below. Hind ocelli separated from each other by a less distance than they are from the anterior. Above the eyes are separated by slightly more than the length of the 3rd antennal joint. Last antennal joint slightly shorter than the preceding two united. Thorax almost smooth. Median segment with a wide central, bordered by equally wide curved lateral furrows; the central is closely striated, except at the top and bottom; the lateral have some irregular striæ; apical slope irregularly striated and thickly covered with silvery pubescence. Petiole slightly longer than the thorax and the following 3 segments united. Radial cellule long and narrow; the apical abscissa of radius fully 3 times longer than the basal. Fore legs brownish in front; the last joint of fore tarsi and the 4 front calcaria pale testaceous, the hind calcaria black. The 2nd abdominal segment is more than double, the 3rd and 4th not double so long as wide at the apex. Third antennal joint distinctly longer than the 4th, more than twice the length of the pedicle.

Comes near to *T. leptogaster*, Kohl. It may be known from the Cape *T. foveatum*, Cam. by the front and vertex being without an area bordered by keels.

*Pison iridipennis*, sp. nov.

Black, the head, thorax and basal segment of abdomen rugosely strongly punctured, the rest of the abdomen more closely and less strongly punctured, the punctuation becoming closer towards the apex; the pubescence on the head and thorax silvery, on the abdomen silvery, distinctly tinged with golden. Wings hyaline, tinged with fuscous, very highly iridescent; the first recurrent nervure received shortly beyond the transverse cubital, the 2nd interstitial. Male.

Length 8 mm.

Clypeus becoming gradually narrowed towards the apex, ending there in a stout, distinct tooth. Hinder ocelli separated from the eyes by about the same distance they are from each other; the anterior is separated from the posterior by a greater distance than these are from each other. On the centre of the basal half of the metanotum is a wide deep furrow; its basal half irregularly striated, the apical smooth; the apical furrow is narrower and deep. Legs covered with silvery pubescence.

*Oxybelus striatiscutis*, sp. nov.

Black, scape of antennæ yellow, the flagellum rufous; mandibles yellowish at the base, the middle piceous red, the apex black. Tegulæ, tubercles, a mark on the basal half of the scutellum on the sides, the lateral spines, broad bands on the sides of the basal 4 abdominal segments and a narrow band on the apex of the 5th, pale yellow. All the tarsi and the fore tibiæ rufous, the middle tibiæ yellowish in front, rufous behind, the base of the hind tibiæ marked with yellow. Apex of pronotum yellow, transverse. Tegulæ yellow in front, blackish behind. Wings hyaline, the nervures black. Female.

Length 8-9 mm.

Head rugose, thickly covered with silvery pubescence. Thorax closely rugosely punctured. Scutellum as strongly, but not so closely punctured as the mesonotum ; its apical two-thirds keeled down the centre, its apex depressed, the central keel dividing the depression into two ; on eitheir side are 4 or 5 stout keels. Lateral plates large, triangularly produced laterally at the apex ; the inner part roundly narrowed. The apical plate is large, about 3 times longer than wide, the basal roundly depressed, the sides raised ; roundly curved outwardly, not straight, the apex roundly incised, the incision longer than it is wide at the apex ; the centre is keeled, and, from the central keel, others run obliquely to the sides. Abdomen closely and strongly punctured. Pygidial area roundly narrowed gradually from the base to the apex, which is slightly roundly incised; it is irregularly wrinkled; the apical half covered with golden pile. Epipygium coarsely punctured in the middle, more finely laterally. Metapleuræ closely longitudinally striated.

Comes near to *O. ruficaudis*, Cam. The two may be separated thus :—

Scutellar plate small, not reaching to the middle of the 1st abdominal segment, not striated, the apical incision wider than long; the apical segment rufous.
*ruficaudis*, Cam.

Scutellar plate large, reaching to the middle of the 1st abdominal segment, stoutly striated, the apical incision longer than wide the apical segment black.
*striatiscutis*, n. sp.

## CEROPALIDÆ.

*Anoplius mimeticus*, sp. nov.

Length 12 mm. Male.

March.

This species is very similar to *A. hirtiscapus*, Cam., having like it, the body black, the head and thorax densely covered with long pale hair, the hair on the scape long and black, the abdominal

segments with broad bands of silvery pubescence, the last segment white and the wings hyaline, smoky round the apex from the 3rd transverse cubital cellule The two species may be separated thus:

Temples roundly obliquely narrowed, the occiput being also rounded, the two forming one rounded curve; apical abscissa of radius roundly curved; 2nd cubital cellule in front longer than the 3rd, behind equal in length with it; 3rd transverse cubital nervure roundly curved in front.

*mimeticus*, n. sp.

Temples obliquely narrowed, the occiput transverse, apical abscissa of radius straight, oblique; 2nd cubital cellule before and aft shorter than the 3rd, 3rd transverse cubital nervure straight, oblique in front.

*hirtiscapus*, Cam.

The mandibles are ferruginous, black at the apex; the 3rd antennal joint is slightly longer than the 4th; the antennæ stout, as long as the thorax; the eyes are parallel, not converging; the head, pro- and mesothorax distinctly punctured; the median segment opaque, alutaceous, narrowly furrowed down the middle; the apex with rounded slope. The long spur of the hind tibiæ extends beyond the middle of the metatarsus (in *hirtiscapus* it does not extend to the middle); the tarsi sparsely spined; the claws bifid.

*Anoplius bretoni*, Guér.

Mr. O'Neil has taken, what I make out to be this widely ranging species at Dunbrody. The inner eye orbits are broadly dark, the outer more narrowly of a brighter brown colour; and there is a broad brown band in front of and at the sides of the ocelli. It belongs probably to the genus *Aphiloctenus* Ashmead. *Pompilus solanus*, Kohl appears to be the same or a closely allied species.

## VESPIDÆ.

*Odynerus (Leionotus) melanodontus*, sp. nov.

Black; the apex of the clypeus rufous; an oblique spot on either side of its top above, a spot above the antennæ, broader than

long, slightly incised in the middle below and dilated above, a line on the lower part of the eye incision, a small line on the outer orbits above, a small irregular mark on the sides of the scutellum near the apex ; a line on the apex of the 1st abdominal segment, the line largely dilated backwards at the sides and the apex of the 2nd segment more broadly, yellow ; the apices of the other segments brownish. Four front legs yellow, their coxæ and trochanters black ; the tarsi and apex of tibiæ dark rufous ; hind femora for the greater part black ; tibiæ yellow, their apex and the tarsi dark rufous. Antennæ blackish above, the scape below yellow, the flagellum brownish. There is a narrow rufous line on the edge of the pronotum ; the tegulæ and tubercles rufous. Wings fuscous-violaceous ; the nervures and stigma black. Male.

Length to end of 2nd abdominal segment 8 mm.

Clypeus as long as it is wide in the centre ; coarsely and closely punctured, its apex depressed and with a shallow incision. Mandibles rufous, tinged with yellow at the base, the teeth black. Head closely, rugosely punctured, a longitudinal depression behind the ocelli. Thorax, except the metapleuræ, coarsely, rugosely punctured. Sides of post-scutellum projecting into stout teeth at the base. Abdominal segments closely punctured. The 2nd cubital cellule much narrowed in front.

This species closely resembles *O. Schönlandi*; the two may be separated thus :

A continuous curved line on the top of the clypeus ; post-scutellar spines testaceous.

*Schönlandi.*

Two spots on the top of the clypeus ; post-scutellar spines black.

*melanodontus.*

*Odynerus dunbrodyensis*, sp. nov.

Black, the upper and lower third of the clypeus, the sides in the middle narrowly, a small mark, obliquely narrowed above the apex transverse, above the antennæ, a narrow, roundly curved line on the centre of the apex of the pronotum, a curved mark near the inner edge of the tegulæ, the apex of the 1st abominal segment narrowly above, and of the 2nd more broadly all round, yellow ; a

## On the use of the term *Anomodontia.*

By R. BROOM, M.D.

Considerable confusion is caused by the fact that the term *Anomodontia* is used by palæontologists in very different senses. By Seeley, Lydekker, Andrews and Smith Woodward it is used for a group which includes the *Pareiasauria*, the *Procolophonia*, the *Dicynodonts*, and the *Theriodonts*. By Osborn and Boulenger the term is used to include only the *Dicynodonts* and the *Theriodonts*, while by Cope, Baur, Case, Gadow and Broom it is used as synonymous with the *Dicynodontia* of Huxley for those reptiles which are more or less closely related to *Dicynodon*.

The reason for the confusion is that while the term *Anomodontia* as first proposed by Owen in 1859 was held to include three "families,"—the *Dicynodontia*, the *Cryptodontia* and the *Gnathodontia*—in 1861 he placed the *Theriodonts*, *Galesaurus* and *Cynochampsa* in another family,—the *Cynodontia* of the same order. In 1876 he removed the *Cynodontia (Theriodontia)* and the *Gnathodontia* and made the order include only the *Dicynodon*-like forms. The question thus arises whether we are to follow Owen's first view or his second. Lydekker considers that "although . . . there may be some doubt whether the inclusion of the *Cynodontia (Theriodonts)* in the *Anomodontia* was not due to an error, yet the fact that such a classification was published, together with the subsequent use of the latter term in this sense by later English writers, seems to justify its retention." Osborn evidently considers that by including the *Cynodontia* Owen raised the order to a superorder.

To understand clearly the origin and meaning of the term it is necessary to look at Owen's early papers. In 1845 he gave his first description of *Dicynodon* and stated that it was "indicative of a new tribe or suborder of *Sauria*." In summing up the affinities of the genus he stated that the skull, which was all that was then

known, seemed to be "organised according to a type essentially Lacertian, but with Crocodilian and Chelonian modifications." "It is not, however," he added "amongst the modern Lizards that we find the nearest approximation to the *Dicynodon*. For this we must go as far back into the period of Reptilian existence as the epoch of the new red sandstone, when the *Rhynchosaurus* manifested the Lacertian type of skull combined with edentulous jaws, which most probably were sheathed with horn. But the Lacertian type is more closely adhered to in the *Rhynchosaur* than in the *Dicynodon*: "What concerns us most in the present enquiry is the anomalous edentulous sharp edge of the upper and lower jaws in the ancient *Rhynchosaur*, and the Chelonian form of the deep lower jaw, the same anomaly having been repeated in the extinct African Lizard of apparently as remote a period, with the super addition of Mammalian canine tusks. For the rest, however, much difference of form is manifested in the two extinct genera." This early paper thus not only explains the association of *Rhynchosaurus* with *Dicynodon*, but gives us the origin of the term *Anomodontia* in the anomalous condition of the armature of the jaw. And though the name was only applied in 1859 there seems to have been no change in Owen's views, and there can be little doubt that he intended the term for reptiles more or less resembling *Dicynodon*. With *Dicynodon* he included *Oudenodon* and also *Rhynchosaurus*, though he recognised that the latter form was not very closely related to the former. There was, however, no mention made of *Theriodonts* when the term *Anomodontia* was first proposed, and this was not because they were not known in 1859. In 1853 specimens which subsequently became the types of *Lycosaurus tigrinus* and *Cynodraco serridens* were presented to the British Museum, and would most likely have been seen by Owen in that year, and if not, certainly in 1856 when he became Superintendent of the Natural History Collections of the Museum. In 1858 the skull which became the type of *Galesaurus planiceps* was presented by Sir George Grey, and also the snout which became the type of *Cynochampsa laniaria*. These two latter specimens were described in a paper read before the Geological Society on 20th April, 1859. When later in the same

year Owen gave his well-known classification of the fossil reptiles he apparently carefully avoided reference to the *Theriodonts*, because though there manifestly was some affinity between *Galesaurus* and *D cynodon*, it was impossible to fit the *Theriodonts* into the group *Anomodontia* as he had conceived it, and to have done so would have done away with the importance of the most striking character of the group, the anomalous dentition.

In 1861 when publishing his Palæntology he was under the necessity of putting *Galesaurus* somewhere, and naturally he put it near *Dicynodon*. Owen throughout his long career was singularly careful never to make a new order if he thought an old one might do, and he therefore placed *Galesaurus* under the *Anomodontia*, just as later he placed *Procolophon* under the *Theriodontia*. It seems to me however that he merely put the *Cynodontia* as a "family" of the *Anomodontia* for convenience, and had no thought of expanding the *Anomodontia* in such a way as to include *Galesaurus*, for he still defines the *Anomodontia* as reptiles characterised by "teeth wanting or limited to a single maxillary pair" (p. 255), a definition which clearly shows that even in 1861 Owen meant the *Anomodontia* only to include reptiles with an anomalous dentition. Later on, in 1876, he put the *Galesaurus*-like reptiles into a distinct order, the *Theriodontia* equivalent to the *Anomodontia* of which latter he states that *Dicynodon* is the typical genus. The group *Theriodontia* is, however, quite synonymous with the earlier group *Cynodontia*, and there seems no good reason why the name should have been changed.

Recently I have shown that the *Theriodontia* of Owen are not a natural order in that they include animals of at least two very different types. *Galesaurus* is a very mammal-like form with a well-developed secondary palate, and if we may judge by the closely allied *Cynognathus* with two occipital condyles, a rudimentary quadrate and a jaw formed almost entirely by the dentary. The other so called *Theriodonts* described by Owen such as *Cynochampsa*, *Cynodraco*, &c., are not nearly related to *Galesaurus*, having the palate formed on the Rhynchocephalian type, having a single occipital condyle and a large number of other primitive characters. For this latter group I recently proposed the

name *Therocephalia*. We have thus three groups of mammal-like reptiles *Anomodontia*, *Cynodontia (=Theriodontia)* and *Therocephalia*. A fourth allied group is represented by *Delphinognathus* and the apparently nearly allied *Titanosuchus*, to which Seeley's name *Dinocephalia* may be applied. These four groups, of which the most primitive is *Therocephalia*, are all closely related, and should either be regarded as Orders of a single Superorder, or possibly as Suborders of a single Order. For this Superorder, or embracing Order, a new name is required, and I would suggest *Therapsida*. The mammal-like reptiles would then be grouped as follows :

Class—REPTILIA :—
Phylum—SYNAPSIDA.
Superorder—Therapsida.
Order I.—*Therocephalia.*
Order II.—*Dinocephalia.*
Order III.—*Anomodontia.*
Order IV.—*Cynodontia.*

## Preliminary notice of some new fossil Reptiles collected by Mr. Alfred Brown at Aliwal North, S. Africa. By R. BROOM, M.D.

Though already a very considerable number of new fossil reptiles have been described from Mr. Brown's museum, the collection which represents the industry of over forty years is so extensive that, though it has been looked over by both Seeley and myself, much that is new still remains to be described. Compared with many parts of Cape Colony, the Aliwal district is comparatively poor in fossil remains, and detached bones constitute by far the larger proportion of the finds. In the meantime it is impossible to do much with the very large collection of isolated vertebræ and other bones of the postcranial skeleton, but there are clear evidences of many new and interesting forms among the jaws and imperfect skulls. In a recent examination of the collection I came across the following new reptiles, of some of which a more detailed account with figures will be published later.:

*Bowesia Brouni*, g. nov. et sp. nov.

Perhaps the most interesting of the undescribed forms in the collection is a small reptile, apparently allied to *Hyperodapedon*. It is represented by a badly-crushed and imperfect skull, and by a second specimen which consists of a few detached skull bones and some other bones of the skeleton. A third specimen possibly belonging to the same form consists of a fairly good pelvis and some imperfect limb bones.

The animal was probably about the size of *Rhynchosaurus*, but owing to the fragmentary nature of the remains, it will be some time before it will be possible to give a detailed account of the form.

The posterior half of both mandibles is fairly complete. The dentary, so far as preserved, has at least four rows of denticles arranged along its upper and inner side. Each little tooth is a blunt enamelled point which rises about ½ mm. above the bone.

The surangular is of large size and forms the greater part of the posterior half of the jaw as viewed from the outer side. It overlies a large hollow space in the jaw. The angular, and what I regard as the splenial, form the lower part of the jaw. There is no distinct coronoid visible, but it may be present. A good part of the articular is present. The length of the jaw from the posterior part to the beginning of the denticles is about 35 mm., and the greatest depth of the jaw is probably about 14 mm. (11 mm. as displayed).

The cast is preserved of the greater part of the jugal, and of part of the quadrato-jugal, post-orbital and maxillary. The jugal forms the whole of the lower border of the orbit and divides behind as in *Sphenodon*, into an upper part which meets the post-orbital, and a lower which meets the quadrato-jugal. The orbit has probably been about 18 mm. in diameter. The greatest length of the jugal is about 23 mm., and the depth below the orbit 4 mm. In the lower part of the orbit are 3 or 4 little bony fragments which may be sclerotic plates.

The palatal portion is so crushed that it is difficult to be certain of its structure. There is a well developed bony ridge covered with 4 or 5 rows of denticles like those of the dentary, but whether this tooth-bearing ridge is maxillary or palatine, or both, it is impossible at present to decide with certainty. What evidence there is, however, seems to point to the ridge being palatine, as the denticles are mostly on its outer and under surface.

If my interpretation of the displaced and imperfect post-cranial bones be correct, we have a well developed scapula, coracoid, clavicle and interclavicle. The pelvis which I believe to belong to the same form bears some little resemblance to that of *Belodon*. The ilium however is relatively longer, and the ischium is plate-like. The pubis is twisted, but forms part of the acetabulum.

*Howesia* seems to be a near ally of *Hyperodapedon* but less specialised. The Kota-Maléri beds of India in which *Hyperodapedon* occurs are apparently of the same age as the Stormberg beds of South Africa, and are thus probably Lower Iurassic. The Aliwal beds are most probably Upper Triassic.

I have named this genus in honour of the late Prof. G. B. Howes. whose work on the allied *Sphenodon* will probably ever remain the standard work on the development of the reptilian skeleton. His early death is a severe loss to the zoological world, and it will be especially keenly felt by the younger generation of zoologists, to whom he was always so willing to give assistance and advice.

### *Trirachodon minor*, n. sp.

The type of this new species is the crushed and rather badly wethered front portion of a skull. In general it agrees fairly closely with *Trirachodon Kannemeyeri*, so far as preserved. There has been a hard palate passing back as far as the plane of the 6th molar. On the right side portions of one incisor, the canine, and four molars are preserved. The canine measures 5.6 mm. by about 3.8 mm., and is followed after a diastema of 1.5 mm. by a small molar or premolar 1.8 mm. in length. The second molar is 2.2 mm. long and 3 mm. broad. The third molar is 2.5 mm. by 3.5 mm., and the fourth about 3 mm. by 5 mm. The

length from the canine to the fourth molar inclusive is 16.4 mm. The line of the outer side of the molars when continued forms a tangent to the inner side of the canine.

The greatest width of the snout is estimated to have been about 25 mm. The length of the palate from the front of the snout to the end of the hard palate has probably been about 35 mm., and the length from the anterior end of the snout to the front of the orbit probably about the same.

Unfortunately none of the crowns are preserved and it is impossible to be certain if the species should be referred to *Trirachodon*, but so far as preserved the agreement with that genus is sufficiently close to render it advisable to place it provisionally in that genus.

In a second specimen of the same species there are seven molars which measure 18.5 mm. The crowns are not well preserved but appear to agree with those of *Trirachodon*.

*Sesamodon Browni*, g.n. et sp. n.

In the collection are two imperfect skulls and a few fragments of jaws of a small *Theriodont*-like reptile. In general the form bears some resemblance to *Trirachodon*, but differs markedly in the structure of the teeth. The length of the snout to the front of the orbit is estimated to be about 36 mm. The nasal bones are broader in front than behind, and there is no evidence of there having been an internasal premaxillary process. A well developed secondary palate is present.

There are four upper incisors of which only the roots are preserved. It is probable, however, that the incisors were pointed, and they were certainly not persistent. The length of the four incisors is about 13 mm. Behind the 4th incisor is a diastema of 6 mm. The canine is not much larger than the incisor and is moderately round on section. It measures about 3·5 mm. by 4 mm. About 1·5 mm. behind and somewhat internal to it is a rudimentary molar or premolar about 1 mm. in diameter. Following this is a short diastema of 2 mm. and then follow six well developed molars. The first of the six is comparatively small, but the molars increase in size to the 4th. The 5th is about the same

size as the 4th, and the 6th is somewhat smaller. The six well developed molars measure 19 mm. Each molar is broader than long—the 5th being 5 mm. by 3·5 mm. The root of each molar is long and has a large pulp cavity. The crown is short and well enamelled. At the base of the crown the enamel forms a feebly thickened ridge, and from here the crown gradually tapers. In all the specimens the crowns are worn down to between 2 mm. and 3mm in height. As a result of the wearing the dentine is exposed in every case, and surrounded by a ring of enamel. There can be no doubt that there has been some degree of antero-posterior movement of the jaw.

The lower dentition is very similar to the upper. There are three incisors and a fair sized canine. The incisors measure 11·5 mm. Behind the canine is a diastema of 5 mm., and then follows a series of 6 or possbily 7 molars. The dental formula would thus be :

$$i\,\tfrac{3}{3}\ c\,\tfrac{1}{1}\ m\,\tfrac{7}{7}?$$

Neither mandible is complete; but it may be regarded as very probable from the condition of the preserved back part of the dentary that there was a distinct articular.

*Sesamodon* may at present be provisionally placed with the *Theriodonts* (or *Cynodonts*), but it cannot be placed near to any of the typical forms, and may ultimately prove to be the type of a new Suborder connecting *Theriodonts* and Mammals. The family to which it belongs may be called the *Sesamodontidæ*.

*Melanodon simus*, g.n. et sp.n.

This genus and species is founded on the imperfect skull of a small animal belonging apparently to the same family as *Sesamodon*. The animal is remarkable for having had a very short pointed snout and very large orbits. The molar teeth, which are very well preserved, are seven in number, and are fairly uniform in size. The whole molar series mearures 14 mm

In structure they resemble those of *Sesamodon*, but there is no thickened ridge of enamel at the base of the crown. The skull probably measured 50 mm. in width at the orbits, and the orbit is

about 20 mm. in diameter. The snout on the plane of the 1st molar is probably only about 15 mm. wide.

*Thelegnathus Browni*, g.n. et. sp. n.

In the collection are a number of fragments of jaws with teeth closely resembling those of *Procolophon*. Unfortunately there are no satisfactory skulls or bones of the skeleton. From the structure of the teeth, however, there seems little doubt that the remains belong to a member of the *Procolophonia*.

The numerous fragmentary remains belong to at least two species, and possibly to three. The majority of the fragments and the best preserved belong to an animal a little larger than *Procolophon trigoniceps*, and indicate a new genus and species which I propose to name as above. It is represented by a fairly good left maxilla with teeth, the front of the right dentary, and a few other fragments

In the maxilla there are 6 and possibly 7 molar teeth, and as in *Procolophon* they are anchylosed to the bone. In structure and shape the teeth also resemble closely those of *Procolophon*. They differ, however, in becoming steadily larger on passing back. The antero-posterior measurement of the first 6 molars is 17.5 mm and all the teeth are about 4 mm. high. The maxilla is fairly flat, and measures 27 mm. by 12 mm. It has two fairly large foramina, the first above the interspace between the 2nd and 3rd molars, and the second above the interspace between the 5th and 6th.

A second specimen shows three maxillary teeth in beautiful preservation. They are probably the 4th, 5th, and 6th. The 4th is 2·5 mm. by 4 mm. and 4.3 mm. high. The crown is distinctly constricted antero-posteriorly in the middle, and though a little worn, it is fairly sharp. The 5th tooth is 2·8 mm. by 5 mm., and the 6th tooth is 3·5 mm by 6 mm. The 5th and 6th teeth are less constricted than the 4th.

The dentary is relatively slenderer than in *Procolophon*. There are in the preserved portion 5 teeth remaining, and the sockets of 3 more in front. The 5 measure 17 mm.

From the shape of the maxillary bone, and from the narrowness of the dentary, it seems probable that *Thelegnathus* had a longer and narrower skull than *Procolophon*.

*Thelegnathus parvus*, n. sp.

This species is founded on a small fragment of probably the maxilla, bearing five molars. It is not improbable that the species belongs to a distinct genus, but as it is apparently allied to *Thelegnathus*, it seems advisable to refer it provisionally to this genus. The teeth are fairly like those of *Procolophon*, but much smaller. They are anchylosed to the bone, and are placed more closely together than in either *Procolophon* or in *Thelegnathus Browni*. The 5 teeth measure 9 mm. The largest, which is the posterior, measures 3.5 mm. in width. The teeth are scarcely at all constricted, the sides being almost parallel.

## Notes on the Localities of some type specimens of the Karroo Fossil Reptiles. By R. Broom, M.D.

Though the collectors of fossil reptiles have been much more careful in giving exact localities than were the early botanists who too often seem to have been quite satisfied to label a specimen "Cape of Good Hope," yet for the determination of the various zones or divisions of the Beaufort beds more exact information is often required than that with which we are provided. Andrew Bain and Thomas Bain were both usually careful to give the name of the farm on which the specimens were collected, but in sending large collections to London occasionally the specimens appear to have got mixed. It is, of course, impossible now to correct mistakes made 60 years ago, except in a few cases. A few corrections which I am able to make in the localities as given in the British Museum Catalogue of Fossil Reptiles appear to be worth recording.

*Procolophon trigoniceps.*—The type and the other three specimens in the British Museum are all stated to have come from "Tafelberg." In the Karroo, where intrusive sheets of dolerite are so numerous, there are many Tafelbergs. To the south of Rosmead Junction there is a railway station of the name, and though *Procolophon* occurs in that neighbourhood, where the very fine series of specimens in the Albany Museum was procured it was not here that the British Museum specimens were obtained. The first specimens were found by Mr. D. White, of Donnybrook on the Upper Zwart Kei, between Queentown and Tarkastad, no doubt at Tafelberg, a mountain near Donnybrook. A number of specimens were presented to the Grahamstown Museum, and two of these specimens were transmitted to the British Museum "for determination and description" by Dr. Atherstone. *Procolophon minor* was also collected by Mr. D. White, and also *P. laticeps.*

*Dicynodon testudiceps.*—In the British Museum Catalogue (1890) this specimen is said to have come from the "Stormberg beds of the Karroo system on the Modder tributary of the Orange river." In Owen's Catalogue (1876) the locality is given as the "Tacka [Tarka] prolongation of the Winterberg range of mountains." In Andrew Bain's own copy of his paper "On the Discovery of the Fossil Remains of Bidental and other Reptiles in South Africa" (1845), which was recently presented to the South African Museum by his grandson, there is a note in his own handwriting in connection with the statement that *D. testudiceps* came from the Modder River (p. 58) as follows:—"This is incorrect as *D. testudiceps* was found near Fort Beaufort, the head from the Modder River was that of a small Chelonian."

*Platypodosaurus robustus.*—When this specimen was originally described by Owen (1880) it was stated to have come from Graaff Reinet. In the British Museum Catalogue (1890) the locality is given as "the Karoo system of Catalomds, Claremont." The specimen was presented dy Mr. E. J. Dunn who resided in a house called Oatlands in Claremont, a suburb of Capetown. This is no doubt the explanation of the rather curious blunder in the Catalogue. "*Platypodosaurus robustus*" is almost certainly

synonym of a species of *Oudenodon* probably *O. magnus*, and Graaff Reinet is no doubt the correct locality.

*Nythosaurus larvatus.*—The locality given for this specimen in both Owen's and Lydekker's Catalogues is "Tafelberg." In the copy of Owen's Catologue belonging to the Port Elizabeth Museum there is a note stating that the specimen came from the "East side of Commissee Drift, Caledon River," and to have been discovered by Mr. J M.Orpen,"* and apparently by him presented to the Albany Museum. The correction has probably been made by the late Rev. D. D. Fraser, of Bedford, or possibly by his son, Mr. D. D. Fraser, junr., both of whom were greatly interested in the fossil reptiles of S. Africa. There are numerous other minor corrections which go to show that whoever made them was well acquainted with the history of the specimens from the Eastern Province. The Caledon River is situated on the Upper Beaufort beds, and seems a more likely locality than "Tafelberg."

*Anthodon serrarius.*—There is not only some doubt as to the locality of this type, but also doubt as to its affinities. In Owen's Catalogue the three specimens are said to have come from "Bush man's River . . . a marine formation containing teeth of fish, liassic shells and fossil trees in great quantity." This formation has apparently never been examined since Bain's day, but is most probably part of the Uitenhage formation and of Wealden age. In Lydekker's catalogue two of the specimens are stated to have come from "Stylkrantz," Owen's locality being stated to be incorrect. The third specimen is, however, stated to have come from Bushman's River. As Stylkrantz is on beds of Permian age, and Bushman's River Cretaceous, it is pretty certain one or other of the localities is erroneous. A tooth is in the British Museum which undoubtedly came from the Uitenhage beds, and which is stated to be indistinguishable from *Anthodon*. There thus seems a strong probability that the three original specimens were got by Bain at Bushman's River. They were all sent together to the British Museum in 1853. By Owen *Anthodon* was believed to be a *Dinosaur*; by Lydekker and others it has been believed to be

* The same correction has been made in the Albany Museum copy probably by the late Mr. B. J. Glanville.—S.S.]

allied to *Pareiasaurus*. It is to be regretted that the specimens have never been very fully described. The teeth are unlike those of *Pareiasaurus*, and strikingly like those of *Dinosaurs*, and it seems possible that Owen may ultimately prove to be right. It is impossible that a representative of the Permian *Pareiasaurus* should have survived till the Wealden period, and not have appeared in any other part of the world.

[Note by Dr. S. Schönland.—Professor Seeley states in Quart. Journ. Geol. Soc., Nov. 92, vol. 48, p.597, that the *Mesosaurus* in the Albany Museum came from near Burghersdorp. This is incorrect. It came from Kimberley.]

**Report on some South African species of Indigofera in the Albany Museum Herbarium.**

By EDMUND G. BAKER, F.L.S.

**Subgenus** I. EU-INDIGOFERA, Harvey in Harvey and Sonder, **Fl.** capensis 2, 168.

TRIFOLIOLATÆ, Harvey l.c.

*I. denudata*, Thunberg, var. luxurians, Harvey l.c. p. 170.

Hab. amongst the bushes on the Van Staaden's River mountains, *Ecklon* and *Zeyher* No. 276!

*I. heterophylla*, Thunberg Fl. cap. p. 597; Harvey l.c. p. 172!

Hab. Hills near Knysna, Tyson!

**Flowered** Aug. 1888.

**Leaflets** rather narrow.

*I. psoraleoides*, Linn. Mant. 7, p. 271; Harvey l.c. p. 172.

Hab. South West Region; Dal Josaphat, W. Tyson No. 87*J*

**Alt.** 600 feet.

*I. incana*, Thunberg, var. *angustistipulata*, Bak. fil.

Caules adscendentes. Folia trifoliolata. Foliola obovata molliter cano-hirsuta basi cuneata 8-11 mm. longa 6-8 mm. lata stipulis quam iis typi manifeste angustioribus. Pedunculi patentim cano-hirsuti. Calycis lobi lineari-lanceolati cano-hirsuti. Vexillum glabrum. Legumen rectum reflexum cano-hirsutum.

Hab. Port Elizabeth; W. Kemsley, No. 40!

*I.* (*Trifoliolatæ*) *trifolioides*, Bak. fil., nov. sp.

Species *I. stipulari*, Herb. Harv. et *I. dimidiatæ*, Vogel arcte affinis.

Caulis herbaceus elongatus teres superne pilis albidis exigue vestitus. Folia digitatum trifoliolata. Foliola late obovata basi cuneata praecipue subtus sparse strigosa superne marginibus exceptis

glabriuscula 1.8-3.0 cm. longa, 1.7-2.4 cm. lata, petiolo saepissime 2.0-2.5 cm. longo. Stipulae cordato-ovatae acuminatae quam petioli multoties breviores.

Pedunculi valde elongati ex speciminibus mihi obviis 25-30 cm. longi extremitates versus densiuscule floriferi. Pedicelli breves quam calyx breviores. Bracteæ angustae caducae. Calyx pilis albidis vel cinereis vestitus calycis lobi lanceolati acuminati. Vexillum glabrum ± 7 mm. longum ovatum brevissime unguiculatum carinae subaequilongum. Alae brevissime unguiculatae. Carina naviculari formis utrisque infra medium in calcar breve conicum producta. Stylus filiformis incurvatus. Ovarium glabrum pluriovulatum. Legumen haud visum.

Hab. Nqamakwe, Transkei, W. Bennie, No. 388 ! alt. 3000 feet.

This plant differs from *I. stipularis* as represented in Harvey's Herbarium in the following points :—

(*a*). The leaflets are broader in proportion to their length.

(*b*). The leaflets are less densely hispid.

(*c*). The stipules are much smaller.—Harvey describes those of *I. stipularis* as equalling or exceeding the petiole (conf. Maund The Botanist, tab. 191).

*I. trifolioides* differs from *I. dimidiata*, Vogel as represented in Harvey's Herbarium :—

(*a*). By the leaflets being broadly obovate, not ovate lanceolate or lanceolate.

(*b*). The stipules are ovate-subacuminate not semisagittate.

Harvey quotes *I. stipularis* as of Linn. fide E. Mey. Com. p. 96. I think instead of Linn. it should be Link., who describes this species in Enum. Pl. Hort. Berol., Pars II., p. 250 (1822).

DIGITATAE Harvey l.c., p. 178.

*I. bifrons*, E. Meyer Com. p. 97 ; Harvey l.c. p. 179.

Hab. among rocks, south slope of Andriesberg ; alt. 6300 feet E. E. Galpin, No. 6271 !

Gathered in flower, Dec. 1, 1901.

*I. flabellata*, Harvey l.c., p. 180.

Hab. Millwood. Tyson !

Gathered in flower and fruit, Aug. 1888.

PENNATAE Harvey l.c. p. 180.

*I. fastigiata*, E. Meyer var.

**Hab.** Coldspring, J. Glass, No. 216 !

*I. corniculata*, E. Meyer Com. p. 101 ; Harvey l.c. p. 184.

**Hab.** Natal, grassy hill, Inanda. J. Medley Wood, No. 855 ; **alt.** 1800 feet.

*I. Zeyheri*, Sprengel ex E. Z. Enum. p. 241; Harvey l.c., p. 185.

Hab. Johannesburg, Mrs. H. Hutton, No. 285 ! Grahamstown, F. Pym, No. 973 ! Probably also a specimen from Port Elizabeth, W. Kemsley, No. 42 !

*I. Zeyheri*, Sprengel, var. *leptophylla*, Harvey (*I. leptophylla*, E. Z).

Hab. on the hills by the Zwartkops River and on the hills of Addow, *Ecklon* and *Zeyher*, No. 1110 !

*I. heterotricha*, DC. Prod. 2, p. 227; Harvey l.c. p. 189, vel aff.

Hab. Western Region, Kykgad, Max Schlechter, No. 70 !

Differs from type in being much less densely clothed with spreading setae.

PRODUCTAE Harvey l.c. p. 193.

*I. oxytropis*, Bentham ex Harvey l.c. p. 193.

Hab. Johannesburg, Mrs. H. Hutton, No. 280!

*I. natalensis*, Bolus in Journ. Bot 1896, p. 23.

Hab. Natal, Inanda, J. Medley Wood, No. 387 !

*I. vicioides*, Joubert and Spach, Illustr. Pl. Or. t. 481.

Hab. Transvaal, Schlechter, probably No. 3641 !

I do not think this species has hitherto been recorded for South Africa.

## On some South African species of *Aloe*, with special reference to those represented in the Herbarium of the Albany Museum. II.

By DR. S. SCHÖNLAND.

The following notes are a continuation of the paper which I published in the first number of these "Records." Through the kindness of Sir W. Thiselton-Dyer, F.R.S., Director of the Royal Botanic Gardens, Kew, and Mr. Alwin Berger, of La Mortola, I have received a number of species of Aloe cultivated in Europe, and have thus been able to correlate some of these cultivated specimens with plants in their native habitats, and with others which had only been recently taken into cultivation. Some interesting results have in this way already been obtained. From numerous friends in South Africa I have received live specimens, which have extended our knowledge of the geographical distribution of the members of this genus very considerably. Some of the plants which I have grown for years already have not flowered yet, and may turn out to be undescribed species. To Dr. P. MacOwan we owe a small number of Aloes collected by Ecklon and Zeyher. As far as I know, these have never been referred to yet with the exception of a few mentioned in Vol VI. of the Flora Capensis. I have, therefore, thought it advisable to include their determination in this paper. Three of them represent most likely undescribed species, but the material at my disposal is too poor to allow of satisfactory descriptions being drawn up from it. One is referred to under *A. humilis*, another under *A. pratensis*; the third is Zeyher's No. 4176 from rocky places on the Heerelogements mountain, 2nd and 3rd altitude, January. It has multi-flowered, very dense, almost capitate racemes, the bracts are deltoid-lanceolate, the flowers are slightly curved, only 13-17 mm. long; the pedicels are slightly longer than the flowers, and spreading, the only

leaf we have, is thick, ovate-lanceolate, 26 cm. long, 9 cm. broad, channelled in the upper fourth, with marginal prickles very short, separated by irregular rounded interspaces. As a combination of these characters seems to be sufficient to distinguish it from all other known species of *Aloe*, I will call Zeyher's, No. 4176

*A. parvispina*, Schönl. n. sp.

Its affinities to other species are not quite clear to me.

With the increased opportunities of studying the genus I have been struck with the extreme variability of many of the species in two directions. Firstly, there is no doubt that there are many more or less constant forms which have been derived from distinct species *s. str.* These variations exist in nature as well marked entities. But in addition, many species respond to the slightest change in the conditions under which they are grown; a change of soil or a change of climate or both make them alter their features, especially those of the vegetative organs, which are usually looked upon as distinctive, to such an extent, that it is practically impossible to characterise them sufficiently so that others can recognise them again. These second variations, which unfortunately cannot always be distinguished from the first, "represent no permanent lines of more or less independent development in nature, but chance combinations of inconstant characters analogous to cross-sections through some plastic and still unsolidified material" (see B. L. Robinson, "Problems and Possibilities of Systematic Botany," in Science, vol. xiv, No. 352). The formation of hybrids under natural conditions has also to be considered.

To determine the limits of the species accurately and to study the problems bound up with this question, it will ultimately be necessary to raise seedlings from seeds of wild plants on a very large scale, and under varied conditions. Perhaps we may not arrive at such startling results as Mr. N. E. Brown described (Gard. Chronicle 1878, pp. 820-822) in the genus *Haworthia*, where he found 6 plants from Mr. Cooper's collection of succulent plants at Reigate representing 6 described "species," although they were all raised from the seeds of a single capsule of *Haworthia erecta*, Haw., yet the experiments would well repay the time and trouble

spent upon them. I am afraid, however, that we will have to wait until a properly equipped Botanical Garden is established in South Africa, before problems of this nature can be thoroughly taken in hand out here.

The first number preceding each species, mentioned in Vol. VI of the Flora Capensis, is again the number it bears in that publication. For the sake of convenient reference a second number, in brackets, is again added to indicate the page on which it was described in the Flora Capensis.

4 (306). *A. micracantha*, Haw.—Grows sparingly in marshy places near Grahamstown (Featherstone's Kloof, Howison's Poort, Brookhuizen's Poort) fide B. South.—Mr. J. Burtt-Davy, F.L.S., Government Botanist, Pretoria, sent portions of an Aloe (including withered flowers) which grows in similar situations in Swazieland and which is undoubtedly a somewhat more luxuriant form of this species.

7 (306). *A. aristata*, Haw.—Zeyher, No. 4186, quoted by Baker in Flora Cap. without locality comes from "rocky places on the Stormbergen—c.—6th altitude.—Nov."

8 (307). *A. Boylei*, Bak.—Tyson, No. 1428, "in pratis gramminosis pr. Kokstad, Griqualand orientalis, alt. 5000 feet, Feb. 1885," belongs to this species.

9 (307). *A. humilis*, Mill.—Ecklon and Zeyher's, No. 24, is marked on the original label (by Burke?) in Herb. Alb. Mus. *Aloe acuminata*, Haw. (stony heights near Bethelsdorp, 2. altitude Jan. 30). It is in rather poor condition, but cannot possibly be referred to *A. humilis*, Mill. It is quite unlike Bot. Mag. t. 757 and as this illustration is cited by Haworth under his *acuminat* (Haworth, Synopsis Plant. Succ., London, 1812, p. 84), I strongly suspect that E. & Z.'s No. 24 represents an undescribed species, but I cannot venture to describe it from the material at my disposal. Another plant (No. 27, with a label in Pappe's (?) handwriting from carroid hills between Uitenhage and Port Elizabeth probably also collected by Burke) is a variety of *A. humilis*, Mill.

10 (308). *A. pratensis*, Bak.—There is now an original specimen of MacOwan, No. 1896 from the Boschberg, in the Herb. Alb. Mus. From Ecklon and Zeyher's collection, we have a specime

(No. 16; 24. 10; in Burke's (?) handwriting), collected between Botha's Hill and Grahamstown, October. Galpin, No. 6561, from Oxton, near Whittlesea, is also this species.

Zeyher, No. 4178, from "rocky places near Lislap, 3rd & 4th alt., May," is evidently closely allied to *A. pratensis*, though probably a distinct species. The flowers and inflorescence appear to be similar, the leaves are, however, in Zeyher's specimen much thicker, narrower and armed with longer and stronger prickles.

11 (308). *A. virens*, Haw.—I have received live specimens of this species from Mr. A. Berger, La Mortola, Ventimiglio, Italy. They flowered in July and December, 1904. I found the perianth usually decidedly curved, which is also shown in the published figures.

12 (309). *A. Bowiea*, Haw.—A live specimen received from Kew, flowered in Grahamstown, January, 1904, and again towards the end of the year.

13 (309). *A. longistyla*, Bak., occurs at Pearston (Broom) and Aberdeen, C.C. (Magennis).

13a. *A. Peglerœ*, Schönl. (Rec. Alb. Mus. I. p. 118) was sent by Mr. Burtt-Davy from the Origstad Valley, Transvaal.

14 (309). *A. Ecklonis*, Salm-Dyck.—A plant from the Kasouga sandhills, presented by Dr. H. Becker, is undoubtedly this species. It agrees very closely with Salm-Dyck's figure and description, only the colour of the outer perianth leaves is dirty red, tinged with dirty green near the apex, the inner ones are green along the centre and have a broad whitish margin.—This species is closely allied to *A. Boylei*, Bak.

15 (310). *A. brevifolia*, Mill. and the var. *depressa* were received from La Mortola, and flowered in the Museum grounds in Dec. 1904., the var. *postgenita*, also from La Mortola, flowered Feb. 1904.

16 (310). *A. serra*, DC. was also received alive from La Mortola. It flowered in Grahamstown Dec. 1904. According to Mr. Berger it is nothing but *A. brevifolia depressa* with continuous horny margin, an opinion in which I concur.

18 (311). *A. heteracantha*, Bak., was received from Kew in 1902, and from La Mortola in 1903. Neither has flowered yet.

Mr. Berger writes, " the genuine plant gives one the impression of a hybrid."

19a. *A. Schönlandi*, Bak.—I have come to the conclusion that this species must probably be looked upon as a hybrid between *A. striata* and a plant of the *Saponaria* group. The plant received by Dr. Becker from Somerset East and referred to by me on p. 3 is after all not quite identical with *A. Schönlandi* and is probably also a hybrid of similar origin. I am confirmed in my opinion owing to the fact that I received some years ago some seedlings from Mr. Chalwin of the Capetown Municipal Gardens marked "*A. saponaria* from European seeds." These seedlings resemble now *A. Schönlandi* in a marked degree. However they have not flowered yet. They are quite different from any form of *A. saponaria* with which I am acquainted, and as Aloes (especially *A. striata*) are frequently hybridised in European gardens, it is perhaps not far-fetched if I think that these are also hybrids.

19 (311). *A. striata*, Haw.—Ecklon and Zeyher, No. 1 marked *A. paniculata* Jacq. (in Burke's ? handwriting) belongs to this species. The localities mentioned on the original label are " Bothasberg on the Fish River, and between Coega and Sunday River." Flowered July, Aug., 1829.

21 (312). *A. saponaria*, Haw.—Schlechter's No. 9775 mentioned under this species on p. 38 is *A. mitriformis* (as was first pointed out to me by Mr. A. Berger). Even now I am unable to separate by tangible characters the numerous varieties of *A. saponaria*. A plant from Zeyher's collections marked " =D. No. 8635; 1st & 2nd alt.; rocky places on the bank of the Kenko river Oct. belongs to *A. saponaria*, Haw. I must even refer to it :

22 (313). *A. latifolia*, Haw., as was done originally in Bot. Mag. t. 1346. I have at the present time plants growing side by side from suckers of a plant collected in this neighbourhood, which last year exhibited in a marked degree all the characters ascribed to *A. latifolia*, but the majority of the plants now sprung from it would unhesitatingly have to be referred to *A. saponaria*.

24 (314). *A. macracantha*, Bak.—Plants received from Mrs. C. Hutton, who collected them at Ripplemead, Kabousie, in Kaffraria, and which flowered in Grahamstown in April and May

1904, agree very closely with the published description and figure of this species, only the prickles vary with the size of the leaves and even in my largest do not reach quite ¼ of an inch; further the visible part of the perianth is scarlet (not yellow). I may point out that dried specimens of this plant are frequently indistinguishable from dried specimens of *A. saponaria* var. *latifolia*, but in the live state they are very sharply separated.

25 (314). *A. obscura*, Mill.—Through the kindness of Dr. Bolus I have been able to compare his No. 598 with the plant growing in the Grahamstown Botanic Garden referred to on p. 39, and find them identical. To this species belong Zeyher No. 4177 and Burke (?) No. 15 the former from "stony carroid places, in Coega Kamma's Kloof,—1st altitude, May," the latter from "under rocky krantzes between Coega and Sunday's River, 2nd altitude, Sep. 29."

Judging from live specimens received from La Mortola there is quite a different plant grown in European gardens as *A. obscura*. I have had it in flower, but as the inflorescences were damaged by insects, though a few flowers were intact, and as further I do not know whether it is a plant from South Africa I abstain from describing it. It remains to be seen whether this plant is really the original *A. obscura*. Mill., and whether *A. picta* is thus not a synonym of this species. Baker's description of the flower in the Flora Capensis fits the plant from La Mortola.—*A. obscura* (if identical with *A. picta*) has previously suffered through an unfortunate mistake, as pointed out by Salm-Dyck ("Verzeichniss der verschiedenen Arten und Abarten des Geschlechts *Aloe*, &c," Düsseldorf 1817, p. 60). He shows that De Candolle in his "Plantes Grasses" has put the description of the leaves and scape of *A. umbellata* under *A. picta* and vice versa.

26 (314). *A. grandidentata*, Salm-Dyck.—I have received live specimens of this species from Douglas (Miss Orpen) and Warrenton (Miss C. Adams). It is widely distributed in the south-western part of the Kalahari region. Near Pretoria grows a plant which I was inclined to refer to this species as a variety, its inflorescence is denser than in *A. grandidentata*, its flowers more slender and their colour brighter. Some specimens approach the following

species, *A. Greatheadii*. It is perhaps better to look upon it as a distinct species. I will give a description from a speimen collected by Mr. J. Burtt Davy, F.L.S., No. 1855, which I have still growing. Miss Leendertz, No. 166, is the same, also Bolus, No. 10971, from the Houtbosch, alt. c. 4900 feet.

26a. *A. Davyana*, Schönl., n. sp.—Acaulescent. Leaves in a dense rosette, 12-14, rigid, broadly ovate-acute, 9 cm. broad at the base and about as long, a little over 1 cm. thick; in the older ones tip withered and reflexed; upper surface slightly concave, lower convex, upper light green, sometimes reddish in the upper half, with numerous dark green stripes. which are irregularly interrupted, and by which irregular transverse bands are produced, lower surface light green, indistinctly lineate; margin with a narrow horny border, and, almost at right angles to the margin, with very sharply pointed brown horny prickles, which are about 3 mm. long, and are separated by slightly curved interspaces which are 6-7 mm. long. Inflorescence a simple raceme (in Burtt-Davy No. 1855, branched in Leendertz No. 166), c.55 cm. long; peduncle subterete from the base, provided with 6 bracts which bear buds in their axils, floriferous region nearly 20 cm. long, flowers usually not crowded; bracts ovate-cuspidate clasping the lower part of the pedicels, lower about 15 mm. long, upper gradually smaller; lower pedicels about 20 mm. long, upper gradually smaller. Flowers erecto-patent; perianth slightly constricted above the base, but swollen again on the lower surface towards the apex, about 3.2 cm. long, tube $\frac{2}{3}$ this length, pale brick-colour, wings of outer perianth-leaves whitish, centre reddish brown, wings of inner perianth leaves with a yellowish tinge (buds reddish with dark stripes near the apex); stamens and style eventually slightly exserted; filaments and style pale greenish yellow, outer flattened, anthers dark brick-red.

At the present time (March 1905) the leaves of the specimen (Burtt Davy No. 1855) which has been placed in rather rich soil, have reached a length of 26 cm. without gaining in breadth, thus the shape is now quite different, besides the main colour on the upper side is dark green with longitudinal stripes only near the margin, and with lighter spots

irregularly dotted about ; the number of these spots varies considerably in the different leaves.

26b. *A. Greatheadii*, Schönl. (Rec. Alb. Mus. I, p. 121).—This species is closely allied to *A. Baumii*, Engl. et. Gilg. (H. Baum, Kuneni-Sambesi Expedition, Berlin 1903, p. 191, fig. 90). My description was drawn up from wild specimens when gathered, In growing it in the Museum grounds I find that the leaves are variable in shape, sometimes ovate, the spots on the upper surface are sometimes rusty white, the bracts exceed the pedicels in length, the tube of the perianth is a little over $\frac{2}{3}$ its total length.

*A. grandidentata*, Salm-Dyck, *A. Davyana*, Schönl., *A. Greatheadii*, Schönl., and *A. Baumii*, Engl. et Gilg form a series which are linked together to such an extent that they may well be looked upon as species "im werden begriffen," and it will be interesting to study them further in their native homes.

27 (315). *A. Greenii*, Bak.—It seems to be very doubtful whether this species occurs in Natal as stated on p. 39. It is not known to Mr. J. M. Wood. I have grown it for years, and it was therefore, a great surprise to me when I found that this year the plants which I described only last year as a new species under the name of *A. bamangwatensis*, (Rec. Albany Mus. I., p. 122), have lost almost all distinctive characters, and must undoubtedly be referred to *A. Greenii*, which, therefore, occurs near Palapye road station on the upper reaches of the Limpopo River. I saw hundreds, if not thousands, of specimens, but none had leaves more than c.20 cm. (about 8 in.) long, while Baker states that they are 15-18 in. long. In my garden they reach 22 in., and the leaves of the plants from Dr. MacOwan and those brought from Khama's country are now practically indistinguishable. The differences in the flowers have also practically vanished, those on the plants from Khama's country being a little brighter in colour and a trifle larger, but they are growing in better soil, which may account for even these differences.

27a. *A. Dyeri*, Schönl. n. sp.—Stem short, simple. Leaves about 15, rosulate, gracefully recurved, up to 52 cm. long, about 9 cm. broad and 6 mm. thick at the base, lanceolate, tapering

steadily from the base to the tip, concave on the upper surface convex on the lower, sometimes sub-ensiform in the upper portion : upper surface dark green, indistinctly lineate, with a small number of whitish blotches, which are disposed in interrupted longitudinal lines ; under surface greenish white, with more or less interrupted dark green longitudinal lines, which are especially distinct towards the margin, in the lower portion with irregular, dark, transverse bands ; marginal prickles raised, deltoid or slightly curved forward, 3-4mm. long, about 2 cm. distant in the lower portion, about 12 mm. higher up, separated by straight or slightly curved interspaces. Inflorescence about 90 cm. high ; peduncle slender, dark brown, slightly compressed at the base, without empty bracts and branches for about 54 cm., then bearing at short intervals 6 loose racemes in the axils of deltoid cuspidate bracts, which are about 4 cm. long ; floriferous portion of the racemes about 15 cm. long, floriferous bracts scarious, deltoid-cuspidate, light-coloured, with some dark brown longitudinal lines, lower c. 2 cm. long, upper gradually smaller ; pedicels c.7 mm. long. Flowers erecto-patent ; perianth c. 3.4 cm. long, slightly curved, tube strongly swollen at the base, about $\frac{2}{3}$ the length of the perianth, red, lobes with dark red centre, outer with pale red wings, inner with yellowish red wings, inner broader than the outer ; stamens when shedding their pollen, slightly but distinctly exserted filaments flattened, whitish below, yellow higher up, anthers reddish oblong ; style yellow, filiform, exserted after the pollen is shed.

Received from Kew gardens in 1902. Flowered in Grahamstown, June 1903, 1904— Transvaal (without precise locality). J. Burtt-Davy, February, 1905.

The identity of Mr. Burtt-Davy's specimen and the plant from Kew does not admit of doubt. The Kew plant was young when received, and in Aug. 1903, Mr. N. E. Brown informed me that there is no other specimen at Kew which fits my description. It is a most graceful foliage-plant, which I have pleasure in naming in honour of Sir W. Thiselton-Dyer, F.R.S., to whom I owe the plant in the first instance.

34 (317). *A. tenuior*, Haw. is found in the Kentani district, Transkei, Miss A. Pegler, No. 138. Zeyher's No. 4183 from several

localities not very far from Grahamstown is a mixture of this species and the var. *Tidmarshi* of *A. ciliaris*.

37. (318).—*A. gracilis*, Haw. was recently re-discovered by Mr. N. S. Pillans in the mountains near Simonstown, but was also found there by Mr. C. B. Fair in September, 1893 (No. 7941 in Herb. Bolus). It comes very close to *A. striatula*, Haw., and is scarcely more than a variety of this species. The only constant character to distinguish them seems to be that in *A. gracilis* the stamens and style are about the same length as the perianth, while in *A. striatula* they are distinctly exserted. Other distinguishing characters which are, however, not constant, are the following: In *A. gracilis* the leaves are shorter and relatively broader, the marginal teeth more numerous, the leaf-sheaths not so distinctly striped as in *A. striatula*. Again in *A. gracilis* the flowers are yellow, while in *A. striatula* they have usually a red base, then pass into yellow and are greenish at the tip. I may further add that the length of the perianth-tube varies in both.

39. (318). *A. aurantiaca*, Bak.—I owe living plants to Mr. Berger from La Mortola. The original description was taken from a plant that flowered at La Mortola in June 1892. With us it flowered in Dec. 1904, and continues to do so now (March 1905). I found that it is absolutely identical with *A. striatula*, Haw. with which I had previously united *A. MacOwani*, Bak. (Alb. Mus. Rec. I. p. 42). The colour of the perianth varies considerably and is not always bright yellow.

41. (319). *A. mitriformis*, Mill.—As previously mentioned, Schlechter No. 9775 must be referred to this species. To it belongs Zeyher No. 4179 from "stony places on the hills near Bethelsdorp; 1st and 2nd alt., Nov."

47. (321).—*A. succotrina*, Lam.

48. (322).—*A. purpurascens*, Haw.

49. (323).—*A. arborescens*, Mill.

53. (324).—*A. pluridens*, Haw.

These species have given rise to a great deal of confusion, and I hope the following remarks will help to clear the matter up a little.

Mr. J. G. Baker writes in Balfour's "Botany of Socotra" (1888, p. 291): "Botanists and pharmacists have supposed that the plant that furnished it" [the Aloes from the island of Socotra] "was an Aloe figured in 1697 by Commelinus from the Medical Garden at Amsterdam under the name of *Aloe succotrina flore purpureo*—a species which was called *Aloe vera* by Philip Miller and has been characterised by Lamarck and several later authors under the name of *Aloe succotrina*. By the researches of Mr. Bolus this plant has now been ascertained to be really a native of the Cape of Good Hope." However, the plant which Mr. Baker thought to be *A. succotrina* (Bolus No. 2688) is now referred by him to *A. pluridens*, Haw. (Flora Cap. VI., p 323). Through the kindness of Dr. Bolus I have been able to examine his No. 2688 and it is certainly identical with MacOwan's No. 1825 in the Cape Government Herbarium, also referred by Mr. Baker to *A. pluridens*. MacOwan's No. 1825 in the Herbarium of the Albany Museum, from the same locality, has, however, leaves in which the marginal prickles are smaller than in the specimen preserved in the Government Herbarium, and besides they are not so much curved forward. If, therefore, these specimens are rightly referred to *A. pluridens*, Haw., the question arises whether *A. pluridens*, Haw., is distinct from A. *succotrina*, Lam. In carefully studying Commelin's original figure and description, I have come to the conclusion that there can scarcely be any doubt that it is the same plant as represented by Bolus No. 2688, and MacOwan No. 1825, and that, therefore, they must be referred to *A. succotrina*, Lam., and *A. pluridens* is a synonym of the latter.

Now, the typical *A. pluridens*, Haw., as represented by the specimens mentioned above, seems to come so close to *A. purpurascens*, Haw., as figured by Salm-Dyck (sec. 22, fig. 2) that they cannot be separated as distinct species, and as many previous writers agree that *A. purpurascens*, Haw., and *A. succotrina*, Lam., as figured in Bot. Mag. t. 472, and by Salm-Dyck (sec. 22 fig. 1) are the same species, and *A. pluridens* sometimes approaches this plant in the shape of the marginal prickles, which seems to be the only tangible difference, I am of opinion that all these species should be united, and the synonymy would then stand as follows:

*A. succotrina*, Lam., Encycl. I.85 [*A. pluridens*, Haw., in Phil. Mag. 1824, p 299; *A. Atherstonei*, Bak, in Journ. Linn. Soc. 28, 170; *A. purpurascens*, Haw, in Trans. Linn. Soc. 7, 20; *A. sinuata*, Thunb. Diss. No. 5; *A. perfoliata, var. purpurascens*, Ait. Hort. Kew., I. 466; *A. succotrina, var. purpurascens*, Gawl. in Bot. Mag. t. 1474; *A. succotrina*, DC., Pl. Grasses t. 85; *A. perfoliata*, var. *succotrina* Curt. in Bot. Mag. t. 472; *A. vera*, Mill. in Gard. Dict. ed. 8, No. 15 (non Linn.).]

A satisfactory subdivision into varieties is at present impossible. For this purpose our knowledge of the plant in the wild state is too small.

Through the kindness of Mr. Alwin Berger, of La Mortola, I have received cuttings of the plant which in Europe is known as *A. arborescens*, Mill. These have not flowered yet, but there can scarcely be a doubt that it is the same species as the plant figured as *A. natalensis*, Wood et Evans (Natal Plants, Vol. III., pl. 258). The mode of growth of Mr. Berger's cuttings is the same as in *A. natalensis*, namely very bushy, the plant being richly branched and not arborescent at all, but the mode of growth of all these plants varies (see my remarks on p. 294, under *A. Salm-Dyckiana)*. To *A. arborescens* must also be referrred the plant which I had determined as *A. purpurascens* (Rec. Alb. Mus. I. p. 42), and which has the same mode of growth as *A. natalensis*. With a fuller knowledge we shall, no doubt, be able to subdivide *A. arborescens*, Mill. also into a number of more or less well marked varieties. The range of the species, as I take it, is very wide. It is known from the neigbourhood of the Cape Peninsula in the West, it is then known from Komgha, Natal, and (judging from specimens which were received from Mr. J. Burtt-Davy, No. 1363, but which have not flowered yet), it extends to Waterval Boven in the Transvaal. The 2 species here only recognised may be readily distinguished as follows:

Leaves usually green, at the base slightly convex on the lower surface, slightly convex on the upper, marginal spines usually close together, more strongly curved towards the apex than in *A. arborescens*, inflorescence loose, bracts frequently narrower. Habit frequently arborescent. *A. succotrina*, Lam.

**Leaves usually glaucous, at the base strongly convex on the lowe surface, slightly or (more frequently) strongly concave above marginal spines not very close together, inflorescence dens bracts always very broad. Habit usually very bushy.**
***A. arborescens*, Mill**

[Since writing these notes one of my assistants, Miss M. Daly pointed out to me that one of our plants of *A. succotrina*, Lam (until recently typically *A. pluridens* Haw.) has several sucker in which the leaves vary to an extraordinary degree. Some hav quite smooth margins, in others there are a few marginal prickle irregularly placed, but smaller than usual, others again have a fe small prickles at the base, and are smooth higher up. I shall tr to find out whether these characters are permanent.]

51 (323). *A. speciosa*, Bak., extends to Pearston, where it wa found by Dr. Broom.

57 (325). *A. Salm-Dyckiana*, Schult. fil.—Cuttings from th plants in Capetown referred to on p. 44 of these "Records" hav been grown by me in the Museum grounds, and have flowere during the past two winters. They agree well with cutting received under the same name from Mr. Alwin Berger, La Mortol which have also flowered. I do not know what size they ma reach ultimately, but in both cases, instead of growing after th manner of *A. ferox*, which the plant does in Capetown, and whic one would expect from the description in the Flora Capensi they have branched very copiously after the mannner of *A arborescens* (*A. natalensis*, Wood et Ev.), as figured by Wood i "Natal Plants," III. t. 258. I have noticed the same lately i several plants of *A. succotrina*, Lam. (*A. pluridens*, Haw.), whic as a rule, grows with a clean unbranched stem to a considerabl length, and which I had never seen in the wild state to assume bushy growth.

The plant figured as *A. Thraskii*, Bak. in "*Icones Horti Thea ensis*," Tom. II. pl. 60, appears to be this species. As grown i the Capetown Botanical Gardens its superficial resemblance *A. ferox* and its allies are very deceiving, in fact I do not se why it has been placed in a different subgenus.

59. (325).—*A. dichotoma*, Linn. fil. was collected at Kammapus (3rd altitude) by Zeyher. Unfortunataly our specimen is without a number. It was gathered in May with flower-buds.

61. (326).—*A. falcata*, Bak., is now represented in Herb. Alb. Mus. by Zeyher's No. 1678, on which the species was founded. It shows that, as I thought, it is quite distinct from

*A. Schlechteri*, Schönl. (Rec. Alb. Mus. p. 45), which may have to be made the type of a new genus when living material is available. Besides the locality named in the original description, it occurs in the neighbourhood of Douglas, Griqualand West, whence it was sent by Miss K. Orpen to the Cape Government Herbarium.

Postscript.—The paper on the genus *Aloe* recently published by Mr. A. Berger in Engler's Bot. Jahrb. has not reached me yet, but the following extracts from a letter received from him on March 30th will be of interest in connection with the foregoing notes and my first paper on the same subject: "After a renewed careful comparison of Wood's photograph of *A. natalensis*, I think I can say for certain that it represents the old *A. arborescens*"

"At present we have here in flower *A. ferox* and *A. supralævis*. I am of your opinion that they are only varieties of the same species, but there are not only two, but a whole series of varieties." "There are here also hybrids between them and *A. Salm-Dyckiana*. One was received from the Transvaal, another seems to have arisen here. The latter was described and figured by De Wildemann in the *Ic. Selecti Horti Thenensis* as *A. Thraskii*" "Altogether the various species of *Aloe* hybridise here so easily that it is impossible to breed them true from seeds. The *Saponariæ* are the worst. Each seed-bed of our nurserymen furnishes 'new' species. How do they behave in this respect in their native home?"

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# On the Hymenoptera of the Albany Museum, Grahamstown, South Africa.

By P. Cameron.

(Third Paper).*

## SCOLIIDÆ.

The species of *Plesia (olim Myzine)* appear to be well represented in South Africa. The females are easily enough separated; but as regards the males they are at present in great need of a thorough revision. To do the work thoroughly I should think that a considerable number of specimens would be necessary, and a critical examination of the types of Guérin, who has described (Dict. pict. d'Hist. nat. v.) 14 species from North Africa (chiefly from Egypt). My impression is that the species (males) should be easily enough separated by structural characters—form, sculpture, neuration—if the colouration and markings be somewhat unsafe guides for specific discrimination. Size also appears to be an untrustworthy guide.

*Plesia melanaria*, sp. nov.

Black, shining, densely covered with long white hair, the apex of the fore tibiæ and fore tarsi rufous; wings fuscous, tinged with violaceous, the nervures and stigma black. Underside of flagellum of antennæ, dark, the basal two-thirds of the mandibles bright red. Female.

*See also "On some new Genera and Species of Hymenoptera from Cape Colony and Transvaal," Trans. of the South African Philosophical Society, xv, pp. 195-257.

Length 15 mm.

Brak Kloof. Mrs. G. White.

Front and vertex with fine, scattered punctures, the centre of front more closely and coarsely punctured on the lower half. Pronotum finely, but not closely punctured, the apical half of the pronotum smooth. Middle lobe of mesonotum smooth at the base, the rest moderately closely and strongly punctured. Scutellum punctured round the sides; the apical half of post-scutellum more closely punctured. Metanotum closely, finely punctured except for a stripe on the basal half, this being wide at the base; the apical slope in the centre closely, obliquely striated. Pro- and metapleuræ smooth and almost bare; the mesopleuræ punctured and pilose. Apical segments of abdomen closely, finely punctured; the pygidium piceous red, its base fringed with long, bright rufous hair. Second transverse cubital nervure very obliquely sloped; apex of radial cellule sharply pointed; the apex of radius straight, oblique.

*Plesia rufo-femorata*, sp. nov.

Black, densely covered with long white hair, apex of clypeus broadly, mandibles to near the teeth, palpi, a small mark on the apex of the 2nd abdominal segment, a longer one on the apex of the 3rd, and 2 small ones in its centre, a curved line dilated in the centre on the 4th, a similar one, but interrupted in the middle, on the 5th, and 2 oblique spots in the centre of the 6th, white. Legs black, the femora red; the posterior black at the apex, the 4 hind tibiæ red in front, the anterior white in front; the tarsi more or less reddish below; the calcaria pale. Wings hyaline, the nervures and stigma black; the 3rd and 4th abscissæ of radius equal in lengh, the 2nd not much shorter. Male.

Length 12-13 mm.

O'okiep. September. Rev. J. A. O'Neil, S.J.

Head coarsely rugosely punctured, the punctures running into reticulations in the centre of the vertex. Apex of clypeus broadly rounded. Pro- and mesonotum closely and strongly punctured, except the apical half of the middle lobe of the mesonotum, which is raised and bordered by distinct furrows

the base slightly rounded inwardly, not straight and oblique as in *interrupta*; the occiput is more broadly, distinctly rounded than it is in the latter, which has the centre more distinctly transverse; the incision in the apical abdominal segment is shorter, and the yellow line on the 1st abdominal segment is not dilated in the middle.

*Plesia reticulata*, sp. nov.

Black, the palpi fuscous; the wings hyaline, the nervures and stigma black; the entire body and legs densely covered with white pubescence. Male.

Length 11 mm.

Brak Kloof. Mrs. G. White.

Face, clypeus and eye incision densely covered with long hair. Front closely, regularly, reticulated; the vertex more shining, strongly, irregularly, but not closely punctured, more coarsely along the orbits than in the centre; the temples strongly rugosely punctured and thickly covered with long white hair. Base of pronotum strongly and closely, the apex sparsely punctured. Middle lobe of mesonotum distinctly punctured, the lateral more strongly and closely punctured; the furrows wide, shallow, punctured. Base of scutellum sparsely, the apex closely rugosely punctured; the basal furrow distinct, deep. Post-scutellum closely, rugosely punctured. Base of metanotum broadly raised, irregularly, somewhat strongly reticulated, the sides and apical slope closely rugosely punctured, almost reticulated. Propleuræ finely, irregularly punctured; before the apex with some irregular striæ. Mesopleuræ strongly, closely punctured. Metapleuræ broadly, deeply depressed at the base, shining and bearing some irregular keels; the rest irregularly, obliquely, striate-punctured. First abdominal segment elongate-pyriform with a distinctly narrowed pedicle at the base, this being irregularly, strongly striated; the rest of the abdomen shining, minutely closely punctured, the punctuation towards the penultimate somewhat stronger; the apical is more strongly, irregularly punctured; the centre of the apical half is smooth, and becomes narrowed towards the apex; the sides depressed, the depression forming, with the

raised apex and sides, a broad, punctured furrow. The 3rd abscissa of the radius is the longest; the 2nd is slightly longer than the 4th; the 1st recurrent nervure is received shortly beyond the middle; the 2nd near the apex of the basal fourth; it is straight, slightly oblique, the rest is broadly, roundly curved outwardly; the 1st transverse cubital nervure is roundly curved.

This is a smaller species than *P. carbonaria*; an easy method of separating the two is by the form of the 1st transverse cubital and the 2nd recurrent nervure; in *carbonaria* the former is straight, sharply oblique and elbowed at the bottom, the edge of the geniculation having on the inner side a short projection; the recurrent nervure has 3 curves; a short one in front, almost straight, an oblique curve reaching close to the middle directed outwardly, and the lower and larger part, which is straight and curves slightly towards the base of the wing, the junction of the two forming an angle; in *reticulata* the 1st transverse cubital nervure is roundly curved, and not elbowed below; and the recurrent nervure has only 2 curves; the short, almost straight one in front and the large, broadly rounded apical one.

*Myzine (Meira) violaceipennis*, sp. nov.

Black, the front, vertex and temples bright red; a cream coloured, irregular transverse mark (that on the 3rd the larger) on the 2nd, 3rd and 4th segments of the abdomen; the tarsi and anterior tibiæ in front, rufous; wings, dark fuscous violaceous, highly iridescent, the posterior lighter in tint than the anterior the nervures and stigma black. Female.

Length 16 mm.; breadth 3 mm.

Brak Kloof. Mrs. G. White.

Very smooth and shining; there are 3 rows of deep punctures along the sides of the scutellum; the central part of the mesonotum is bounded by two deep oblique furrows which commence close to the base and reach to the apex; outside this, near the edge, is a narrower furrow, running from the base to the apex. Base of metanotum smooth in the centre; it has there a deep, clearly defined furrow, which extends from the base to the top of the apical slope; the rest of the metanotum closely,

strongly transversely striated. Mandibles deeply furrowed on the lower side, and there is a shorter, narrower, less distinct one on the upper side. The 2nd cubital cellule is shorter than its width along the cubitus; the pedicle is longer than the 2nd transverse cubital nervure; the 1st recurrent nervure is interstitial with the 2nd transverse cubital; the 2nd is received shortly beyond the middle of the cellule; the apex of the radius is roundly dilated outwardly on the lower part. Hair on head, thorax and legs long, black and stiff except on the tarsi; the calcaria white; the fore tarsi, inside and out, bearing long, stout spines. Antennal scape thickly covered with longish stiff hair; the basal 2 joints of flagellum narrowed at the base; the 1st roundly dilated, slightly shorter than the 2nd. The 1st abdominal segment has a distinct narrowed, longer than wide, petiole on the base; there is a narrow, but distinct, transverse furrow near the apex of the basal third of the 2nd and 3rd segments. Pleuræ strongly, deeply but not closely punctured, each puncture having a hair. Hind ocelli separated from each other by a slightly less distance than they are from the eyes. Occiput broadly rounded, not transverse. On the enner side of the top of the eyes is a deep, longish fovea bearing longish hairs.

This is a broader, more robust, species than any I have seen. In this respect it somewhat resembles *M. Klugii*, West., which I only know from Smith's figure (Cat. Hym. Ins. Brit. Mus. iii, f. H.) In the figure the parapsidal furrows are shown only on the apical half, the scutellum is shorter than the mesonotum, in my species it is longer than it; the scutellum in *Klugii* is broader than long, in my species it is nearly as long as its width at the base; and the apex of the metanotum is transverse, not incised as in Smith's figure of *Klugii*. In it, too, the ocelli are placed considerably nearer the eyes, from which they are separated by about one half the distance they are from each other.

## POMPILIDÆ.

### *Microphadnus.*

This genus belongs to the *Aperini*, which name should have been placed above *Microphadnus* on p. 212.

As there seems to be considerable doubt if the name *Pompilus* was ever in actual use in Mollusca (Cephalopods) it hardly appears advisable to drop it in the Hymenoptera. Cf. Schulz, Hymenopterenstudien, 1905, p. 8.

## SPHEGIDÆ.

### *Ammophila erythrospila*, sp. nov.

Black, thickly covered with a white pile and with white hair, the mandibles, greater part of pronotum, tegulæ, 2 lines on the basal half of metanotum, its apex, the greater part of mesopleuræ and the lower half of metapleuræ, rufous. Four anterior legs rufous, the femora and tibiæ more or less marked behind with black; hind legs black, the apex of femora and more or less of the inner side and base of tibiæ black. Wings short, reaching to the apex of the 2nd joint of the petiole; hyaline, the stigma and nervures black; the 3rd cubital cellule scarcely half the length of the 2nd. Male.

Length 20 mm.; petiole 7½ mm.

Table Farm. Mrs. G. White.- Glen Lynden. Miss L. Leppan.

Clypeus about one-third longer than its width; its apex transverse. Hind ocelli separated from each other by a slightly less distance than they are from the eyes. Front, except at the top, somewhat strongly and moderately closely punctured; the vertex sparsely punctured along the sides and between the ocelli. Pronotum punctured, but not strongly or closely, the apex almost smooth. Mesonotum transversely punctured, the punctures with interlacing transverse fine striæ. Scutellum somewhat closely punctured; the centre, with a narrow, finely striated longitudinal furrow. Post-scutellum deeply punctured. Metanotum closely,

strongly punctured, striated, the striæ forming in parts an interlacing network. The propleuræ sparsely punctured, the punctures below running into striæ; meso- and metapleuræ closely and strongly punctured, the punctures almost hid by the dense white pubescence. The sides of the metanotum are bordered, except at the base and apex, by a furrow. Apex of abdomen covered by silvery pubescence. The 2nd joint of the antennæ, together with the 1st are as long as the third. Collar short, much broader than long. Occiput transverse in the middle.

Comes close in structure and colouration to *A. dolichodera*, Kohl; that species should be readily separated by its longer and smooth collar.

## ANTHOPHILA.

*Crocisa maculiscutis*, sp. nov.

Black, with the following patches of snow-white pubescence: the lower part of the front, face, clypeus, except at the apex, outer orbits, a line on the sides and base of the mesonotum, a line in the centre, extending from the base to opposite the base of the tegulæ, an irregular spot on either side of the apex of this line, a broad line on the sides, close to the scutellum, a line or spot on the centre of the scutellum, along the centre of the incision, sides of of metanotum, the greater part of the pleuræ, a large patch on the sides of the mesosternum, a broad band on the base of the 1st abdominal segment, united by a band down the sides to a long band on either side of the apex, and broad bands on the sides of the other segments. The apex of the femora, outer sides of the tibae, and the greater part of the tarsi (in fresh examples probably the whole) thickly covered with snow white pubescence. Wings fuscous-violaceous; the costal cellule in front, the first discoidal on the apical half, the greater part of the other discoidal cellules an irregular hyaline cloud near the middle of the radial cellule,

narrow one along the fore margin of the 1st cubital, from the base of which a similar streak runs obliquely to the 2nd cubital cellule, and a cloud along the outerside of the 3rd transverse cubital, and of the 2nd recurrent nervures. The sides of the incision on the scutellum are straight, oblique, not curved and incised in the middle as in *C. scutellaris*, but more as in *C. picta*; but not so deep and without any widening in the middle, at the base; the outer sides are straight, oblique. The centre of the last abdominal segment is roundly transverse, followed by a rounded depression, the outersides being dilated into projecting teeth; the epipygium is roundly, broadly dilated in the middle.

Length 15 mm. Male.

Katberg. December. Miss Sole.

The middle joints of the flagellum are roundly dilated below; the last is laterally obliquely compressed; the 3rd is about one-third longer than the 4th. Labrum closely and strongly punctured; the upper three-fourths are clearly, widely, deeply furrowed in the middle; the upper half projects largely over the lower.

This species might be taken for a large variety of *C. scutellaris*, F., but the very different form of the apex of the scutellum distinguishes the two; in *scutellaris* the middle is incised, and the sides roundly curved, ending in a sharp point; scutellum, too, wants the patch of pubescence: *C. jaegerskiveldi*, Morice, has a patch of pubescence on the scutellum, but it has the latter formed as in *scutellaris*. According to Morice the results of the Swedish Zool. Exped. to Egypt and the White Nile (No. 14, p. 9) none of the previously described species of *Cricosa* possess this patch (but see Vachal, Ann. Soc. Ent. Fr., 1903, p. 381) but it is to be found in the Cape *C. picta*, Sm. The pubescence on the latter is blue, and the scutellar incision is wide and not clearly defined as in *scutellaris*; it is also much larger.

## THYNNIDÆ.

*Adontothynnus*, Cam.

In connection with this genus (cf. Rec. Alb. Mus. I., p. 161-3) it is worth pointing out that Smith (Descr. New Species of Hym. in Brit. Mus., p. 174) has described an *Anthobosca antennata* from Zululand and Port Natal, which may really belong to my genus. *Anthobosca* differs, *inter alia*, in having the maxillary palpi 5- instead of 6-jointed, and the labrum well developed. If this generic identification of Smith's species be correct, it will make a 3rd species, easily separated from the two I have described by the ferruginous legs.

## ICHNEUMONIDÆ.

*Macrophatnus rufipes*, Cam.

Owing, I believe, to an accident at the printers, part of the description of this species has been omitted. Cf. Albany Mus. Records, I, 232.

Length 12 mm. Male.

Brak Kloof. Mrs. G. White.

Wings hyaline, the nervures and stigma black; the areolet wide in front, the recurrent nervure received in the middle. Front and vertex strongly punctured; the inner orbits on them bordered with rufous mandibles dark rufous towards the apex. Palpi black pro- and mesopleuræ strongly, but not very closely punctured; the former more strongly, rugosely punctured in the middle; the metapleuræ coarsely, closely punctured. Base of metanotum in the middle with a steep oblique slope; the areola has the bounding keel distinct at the base, more indistinct on the sides, and still more indistinct at the apex; the base has the sides rounded; inside the base is depressed, the depression or furrow bearing a few keels. The apical slope is bounded on the sides b-

a keel; the 2 keels converge above, but do not meet, the central part not being bounded by them. Tarsi pilose and spinose beneath; the apices of the joints with longer spines; the calcaria are short, about one-fourth of the length of the metatarsus.

Behind the middle of the mandibles there seems to be a minute incision or depression, the part behind projecting slightly. The areola is the only defined area on the median segment.

*Zonocryptus fumipennis*, sp. nov.

Black, the legs (except the coxæ and trochanters which are black, and the 2nd, 3rd and 4th joints of the hind tarsi, which are white) and the abdomen red; the flagellum of antennæ fuscous below; the upper edge of the mandibles to the teeth lined with yellow; the wings smoky, highly iridescent, the nervures black, the stigma dark fuscous.

Length 8-9 mm. Male.

Grahamstown. Misses Daly and Sole:

Face and upper part of clypeus closely, distinctly punctured, and thickly covered with white pubescence; the rest of the clypeus shining, bare, sparsely, minutely punctured; the space at the sides of the ocelli strongly, obliquely striated, the upper part of the front irregularly, transversely striated; on both parts the striæ are distinct and clearly separated, and do not reach to the eyes, the orbits being smooth. Punctuation on mesonotum close moderately strong, the furrows striated. Scutellum roundly convex, the basal part less closely punctured than the mesonotum, the apex more rugosely punctured, the sides keeled to near the apex. Post-scutellum smooth and shining. Median segment closely rugosely punctured, the punctures running into reticulations in places; the spiracles slightly more than twice longer than wide, elongated oval; there is only one transverse keel distinctly indicated; the second is only weakly indicated at the sides on the outer edge, where it is dilated into a tubercle. Abdominal petiole long and slender, not dilated at the apex, but distinctly tuberculate at the spiracles; the other segments are slender and smooth. The pleuræ are more rugosely punctured than the mesonotum; the punctures

are close, and run into reticulations. Flagellum of antennæ densely covered with short black pubescence. Hind tibiæ sparsely, their tarsi more thickly spinose. The stump of a nervure on the disco-cubital is longish, the transverse median nervure is received shortly behind the transverse basal. Coxæ covered with white pubescence; the posterior closely punctured, the others smooth and shining. The front is only slightly depressed.

*Zonocryptus* was founded by Dr. Ashmead (U.S. Nat. Mus. XXIII, 40) on an undescribed African species (*Cryptus sphingis* Ashm. MS.) Probably *Cryptus erythrogaster*, Holmgren (Eugenies Resa, Hymen, p. 397) from the Cape of Good Hope is another species. That species, however, has the metathoracic spiracles "elongatis," which is certainly not the case with mine.

*Cryptus tuberculatus*, sp. nov.

Black, the abdomen, except the base of petiole and the legs from the apical joint of the trochanters, red; wings hyaline, slightly suffused with fuscous, the nervures and stigma black. Female.

Length 14; terebra 5 mm.

Brak Kloof. March. Mrs. G. White.

Face closely, finely rugosely punctured; its centre produced into a large, longer than broad, tubercle; the middle of the inner orbits narrowly rufous. Clypeus roundly convex, shining, distinctly, but not closely punctured. Upper part of front to near the hind ocelli coarsely transversely reticulated, the lower (and larger) part closely transversely striated. Temples sharply obliquely narrowed. Thorax closely, strongly punctured; the parapsidal furrows and the parts bordering them transversely striated; the furrows shallow; the part between, at their apices, coarsely reticulated. Scutellum finely, irregularly punctured, the apical slope more coarsely, rugosely than the rest; the sides stoutly keeled to near the apex. Post-scutellum with some stout oblique striæ. Sides of metanotum closely, coarsely reticulated; the part beyond the basal keel transversely in the middle at the base; the rest obliquely reticulated-striated; the apical slope coarsely, transversely reticulated. Pleuræ above the middle closely reticulated-

nctured, the rest more strongly, obliquely striated; the meso- d metapleuræ coarsely, closely reticulated. Spiracular area on ›dian segment coarsely reticulated beyond the spiracles, which › elongate, linear. Basal 2 segments of abdomen finely closely nctured; in the centre of the 2nd segment, at the apex, is a ›ression, twice longer than wide, and rounded at the base. ›n from above, the apex of the basal part of the metanotum is nost transverse with the sides toothed; there are 2 traverse ›ls; the posterior largely bent backwards in the middle, the rrowed basal central part being closely transversely striated. sco-cubital nervure broken by a stump. On the upper side the ndibles are rufo-testaceous to near the teeth, which are almost ual in size. Antennal scape brownish; the malar space is as ng as it.

*Limnierium iratum*, sp. nov.

Black, the legs rufous, slightly tinged with fulvous, the coxæ ack, the anterior in yellow at the apex, as are also the trochan- rs; the hind tibiæ fuscous, broadly testaceous in the middle, eir tarsi of a darker fuscous colour, wings hyaline, the nervures d stigma fuscous. Female.

Length 4; terebra 1·5 mm.

Museum Grounds. Grahamstown. November. Misses Daly d Sole.

Eyes with a distinct greenish hue, iridiscent. Head sha- reened, opaque, the sides of the face and clypeus covered with hite pubescence. Pro- and mesothorax closely, minutely punc- ured; the propleuræ somewhat strongly striated on the apical alf. Median segment more coarsely shagreened; areola small, nger than its width at the apex, towards which it becomes adually widened; there is one large basal and a small apical iangular area; the posterior median area is more closely sha- reened than the rest. Propleuræ obscurely striated; the rest osely, minutely punctured. Abdomen aciculated somewhat rongly. Areolet small, longly pedunculated, the peduncle as ng as the outer branch.

## CHALCIDIDÆ.

*Phasgonophora rufo-ornata*, sp. nov.

Black, densely covered with long white pubescence; the front and vertex outside the groove, the lower half of the outer eye orbits broadly, the propleuræ, the part bordering the middle lobe of the pronotum, the sides and apex of the scutellum, and the centre of the propleuræ broadly rufous. Legs rufous, the femora and tibiæ largely black; the hind femora with 9 teeth. Wings hyaline, the nervures black. Female.

Length nearly 8 mm.

Museum Grounds. Grahamstown. December.

Antennæ longish of uniform thickness, the apex of scape and base of flagellum rufous. Head in front rugosely reticulated-punctured; the antennal depression in the centre closely, strongly striated; the outer orbits sparsely punctured. Pronotum at apex broadly depressed in the centre; the sides broadly rounded; the basal slope transversely striated, the striæ becoming stronger towards the apex. Mesonotum strongly transversely striated, the striæ curved; those on the base of the lateral lobes finer and closer. Scutellum coarsely transversely reticulated; its apex bluntly rounded, almost transverse. Metanotum with a double row of areæ, the basal the larger. Pleuræ reticulated, the metapleuræ more strongly than the rest; the meso- widely, deeply depressed in the middle from near the top; the centre of depression closely striated, the sides smooth; the sides of median segment are broadly rounded and with a tooth—stout and narrowed towards the apex—in the centre. Basal segment of the abdomen not quite as long as the other segments (not counting the ovipositor) united; above it is closely, irregularly longtitudinally, finely striated; the apices of the segments, laterally, are rufous. Except the apical 4 (which are also smaller) the femora teeth are clearly separated, distinct, regular and bluntly rounded. The hind coxæ and trochanters are, united, nearly as long as the femora.

I have in my collection from the Cape a specimen which is larger than the above (10 mm. to the end of the ovipositor); it is more largely marked with red, the scape of the antennæ being

entirely red, the flagellum more largely red; the thorax and legs being also more largely marked with red: and the punctuation appears to be stronger, probably from its greater size.

*P. rubeus*, Klug and *P. decorata*, Klug from North East Africa, are allied species.

*Chalcis capensis* sp. nov.,

Black; the lower half of the antennal scape below, yellow, tinged with red; tegulæ dull whitish yellow; legs red; the 4 anterior coxæ and trochanters, fore femora at the base below to near the middle, the greater part of the middle femora, their tibiæ broadly in the middle and the base of the hind tibiæ behind, black; the base and apex of all the tibiæ, the apical half of the fore femora below and more narrowly above, the apex of the middle more narrowly and of the hinder still more narrowly, whitish yellow; the tarsi testaceous. Hind femora with 10 teeth; the basal 3 stumpy and close to each other; the others longer, sharper and more widely separated. Female.

Length 6 m.m.

Katberg. Miss Sole.

Front and vertex rugose, reticulated at the sides of the ocelli and with 3 curved striæ—the outer waved and less distinct than the others. Sides of face strongly, closely, reticulated, the centre more shining and bearing widely separated punctures. Malar space weakly punctured, stoutly keeled below and less strongly on the outer side. Pronotum closely rugosely punctured. Mesonotum more shining, less closely and more strongly punctured; the scutellum is somewhat more strongly punctured than the mesonotum and more closely on the sides than in the middle; the apical teeth are broader than long, irregular, one being broader than the other. Metanotum reticulated a long area of equal width and with 2 transverse keels near the middle; the sides are broadly rounded and untoothed. Propleuræ aciculated, obscurely striated below and at the base apex. Mesonotum shining; the lower part at the base closely reticulated; the middle with some stout, clearly separated striæ on the upper half. Basal half of metapleuræ hollowed, smooth except for some curved striæ at the base; the

apex closely, strongly reticulated and thickly covered with long silvery hair; on the sides, above the middle, is a stout, obliquely turned up tooth. Abdomen smooth; the last segment long, broad at the base, gradually narrowed towards the apex, forming an approach to *Phasgonophora* or *Trigonoura*.

*Chalcis Pymi*, sp. nov.

Black, the base of abdomen, its sides and ventral surface, hind coxæ except below, hind trochanters and femora bright red, the apices of the 4 front femora, tibiæ and tarsi testaceous yellow; the hind femora with 12 stout black teeth; the apical the larger, the basal 4 shorter, broader and closer together. Wings hyaline, the nervures black. Female.

Length 6 m.m.

Grahamstown. Mr. F. Pym.

Front and vertex irregularly rugosely reticulated; the face more irregularly and weakly punctured and thickly covered with long white pubescence; in the centre is an irregular smooth and shining longitudinal line, dilated in the centre; its apex raised, smooth and shining. Occiput irregular, transversely striated; the striæ more or less broken. Pronotum closely, transversely rugose; the mesonotum more strongly, irregularly transversely reticulated; the scutellum more closely rugosely, reticulated; its apex almost transverse and covered with long white hair. Hind coxæ nearly as long as the femora, closely punctured on the sides and below; they are about 3 times longer than their width in the middle. Metanotum reticulated, the base with a row of regular reticulations; above this (on the post-scutellum?) are 2 stout, longish teeth, obliquely directed upwards; below the centre of these is a transversely striated longish area.

*Tanycoryphus*, gen. nov.

Hind femora with one stout tooth shortly behind the middle, the part above it closely, minutely serrate; the anterior femora greatly swollen, twice the thickness of the middle. Antennæ 11-jointed, the scape long and thin, the flagellum stout. Sides of

scutellum bordered by a distinct, thin keel, which becomes narrowed at the apex where they unite ; the apex thus appears depressed in the middle. Sides of metathorax broadly rounded, not toothed.

The fore tibiæ are much thickened, compared with the others ; their spur is long, thin and curved. Tegulæ large, conchiform. Between the antennæ is a plate, which becomes roundly narrowed towards the middle. Ovipositor as in *Phasgonophora*. Malar space longer than the eyes.

Comes near to *Euchalcis* and *Neochalcis*. Characteristic distinctions are the swollen anterior femora and tibiæ, and the plate between the antennæ. The frontal furrow, too, is more clearly defined than usual.

*Tanycoryphus sulcifrons*, sp. nov.

Black ; all the tibiæ and tarsi, under side of their anterior femora, hind tibiæ behind, the apex and the ventral surface of the abdomen, red. Wings hyaline, the nervures and stigma black ; there is a black cloud behind the stigmal branch and there are 2 spurious veins running from the stigmal region ; tegulæ large, piceous. Female.

Length 8 m.m.

Grahamstown, December.

Densely covered with silvery pubescence. Basal half of flagellum dark rufous. Head in front closely, almost uniformly reticulated. Pro- and mesonotum closely, rugosely reticulated ; the centre of the latter more strongly than the sides ; the scutellum is similarly, but more strongly punctured-reticulated. Metanotum deeply reticulated ; the reticulations large. Propleuræ rugose ; the meso- and metapleuræ irregularly punctured. Mesopleural furrow shallow ; irregularly striated, most strongly behind. Metapleuræ reticulated, the sides rounded, not toothed ; densely covered with long silvery hair. The centre of the pro- and mesopleuræ is more strongly and distinctly reticulated than the sides ; the sides of the pro-thorax at the base are keeled, the keels extending on to the pronotum.

*Hockeria melanaria*, sp. nov.

Black, the sides of the head and thorax densely covered with long white hair; the rest more sparsely with white pubescence; wings clear hyaline, iridescent, the nervures fuscous, tegulæ black. Female.

Length 3·5 mm.

Grahamstown. Misses Daly and Sole.

Front laterally and vertex bearing round, not very deep clearly separated punctures; the inner orbits longtitudinally punctured-striated. Malar space longer than the eyes; the lower half with a wide deep furrow. Occiput, except in the centre, closely, strongly reticulated; in the centre is an aciculated space which becomes gradually wider below. Middle lobe of mesonotum closely, rugosely punctured; the lateral less strongly punctured more shining, less strongly and closely punctured on the inner-side; it is roundly convex and clearly separated from the middle lobe. The scutellum is strongly, closely punctured-reticulated; the apical lobes gradually roundly narrowed towards the apex, about as long as they are wide at the base; the lower edge with a distinct bordering keel. On the base of the metanotum are 6 stout, slightly curved keels, which form, longer than wide, areæ; the apical part bears longtitudinal keels, united by more numerous transverse ones; the sides project into a triangular point, above the middle; this tooth is bluntly pointed at the apex, and has the sides equal in length. Propleuræ distinctly regularly reticulated; the rest more closely rugosely punctured. The base of the hind femora is straight and oblique on the underside, the junction of this with the rounded central part forms an angle; the apex projects more than the centre.

The scutellar spines are much broader, compared with their length than in the European species, than in *e.g. H. rufipes*. Above they are distinctly hollowed.

## On some new species of Hymenoptera collected by the Rev. J. A. O'Neil, S.J., at Dunbrody, Cape Colony.

By P. Cameron.

### ICHNEUMONIDÆ.

*Campoplex O'neili*, sp. nov.

Luteous, the flagellum of antennæ, stemmata, and a broad line down the mesonotum, black; wings hyaline, the nervures black, the stigma fuscous; areolet shortly appendiculated; the recurrent nervure broadly rounded; the transverse median nervure received shortly beyond the transverse basal. Male.

Length nearly 8 mm.

May. At light.

Face and clypeus closely, distinctly punctured, almost reticulated; the front and vertex much less strongly punctured; a smooth line down the centre of the front. Eyes obliquely converging on the innerside above. Occiput almost transverse. Thorax above closely, distinctly punctured, the metanotum not areolated; a broad, moderately deep furrow down its centre. Pleuræ closely, distinctly punctured; the metapleuræ more strongly and closely than the rest. The pedicle of the areolet is shorter than the 1st transverse cubital nervure, the 2nd is longer, bullated from shortly above the middle; the recurrent nervure is interstitial with it.

The hind femora &c. are wanting in the only specimen; presumedly they are coloured like their coxæ. There is a broad transverse band on the base of the scutellum, followed by a short longitudinal one; the extreme base of the 2nd abdominal segment is black. The face is only slightly covered with white hair.

*Limnerium garrulum*, sp. nov.

Black; the apex of the 3rd and the whole of the following segments rufo-testaceous; the 4 front legs fulvous, their coxæ and trochanters pallid stramineous; the hind coxæ and basal joint of

trochanters black, the femora and tibiæ rufous, suffused with fuscous, the tarsi fuscous, wings clear hyaline, the stigma fuscous, the nervures paler ; the pedicle of the areolet thick, as long as the basal transverse cubital nervure ; the recurrent nervure received close to the apex of the cellule. Antennæ black, the scape yellow below, the flagellum dark fuscous. Female.

Length 6 mm., terebra 2.5 mm.

Head and thorax covered with a white pubescence. Front and vertex shagreened. Mesonotum somewhat strongly, closely and regularly punctured. Metanotum shining, indistinctly punctured at the base in the centre, the sides closely punctured; the areola large, obliquely narrowed at the base, its apex open, there are 2 lateral areæ, both widely open at the base on the outerside ; the posterior median area bears about 10 stout, transverse keels ; on its apical outerside is a triangular area ; the spiracular is bounded on the outerside by a distinct keel. Post-petiole nodose, longer than wide, clearly separated, aciculated ; the 2nd and 3rd segments are closely, minutely punctured.

"Cape" Coll. Cameron.

## CHALCIDIDÆ.

### *Holceupelmus*, gen. nov.

Eyes large, bare, strongly facetted, rounded and narrowed above and below on the innerside, not converging above. Ocelli separated by a clear space from the eyes. Front and vertex rounded, not depressed. Malar space with an oblique furrow on the outerside ; it is long, the eyes being separated by half their length from the base of the mandibles. Head wider than the thorax. Middle lobe of mesonotum raised, broad and rounded at the base, gradually narrowed towards the apex ; the lateral lobes depressed broadly in the centre. Scutellum broad at the base, a narrow, slightly curved, transverse furrow at the base. Abdomen shorter than the thorax, the segments not incised in the middle ;

the ovipositor largely projecting. Stigmal vein long, thick. Antennæ long, thickened towards the apex, placed close to the mouth. The 2nd abdominal segment is long, nearly as long as wide.

The hind tibiæ have only one spur; their tarsi long and slender; middle tarsi dilated at base, covered below with black, short spines.

In Ashmead's arrangement of *Eupelmini* this genus would come in close to the American genus *Brasema*, Cam. It is not unlike the Cape *Mesocomys*, Cam.; but that genus may be known by the cleft apex of stigmal branch, the broad hair-band on the costa before the stigmal branch, the large, broad middle lobe of mesonotum, the 2 large foveæ at the base of the scutellum &c.

*Holceupelmus bifasciatus*, sp. nov.

Dark purple, the middle lobe of mesonotum largely tinged with blue and green, the front and vertex brassy tinted, the front with a brighter tint than the vertex. Legs blackish fuscous, the knees, apex of tibiæ, hind trochanters, base of hind femora and tarsi whitish yellow, the apex of the middle tibiæ more broadly yellow than the others. Antennæ black, the scape and base of flagellum blue. Wings hyaline, a broad fuscous cloud of uniform thickness in the middle and another, narrowed gradually towards the apex, commencing at the base of the stigmal branch, and reaching close to the apex. Ovipositor yellow, not quite half the length of the abdomen. Head above closely, finely punctured, the thorax and abdomen smooth; the base of the abdomen green. Female.

Length with ovipositor nearly 3 mm.

May.

*Plesia carbonaria*, sp. nov.

Black, a pyriform spot in the centre of the clypeus, the knees narrowly and the anterior tibiæ and tarsi in front and the calcaria, white; the body and legs densely covered with white hair, wings hyaline, the stigma and nervures black; the apical 3 abscissæ of the radius almost of equal length; the 1st recurrent nervure is

received shortly beyond the middle; the front part of the 2nd is roundly curved backwards, the lower from shortly above the middle, straight, oblique. Vertex strongly, but not closely punctured, more sparsely behind the ocelli, the front closely punctured the punctures running into reticulations in the centre. Apex of clypeus broadly rounded. Pro-mesonotum and scutellum strongly punctured; the apex of the pronotum and the centre of the scutellum almost impunctate, Post-scutellum closely rugose. Metanotum closely rugosely punctured, the punctures round and distinct; a broad depression in the centre. Propleuræ closely punctured, more sparsely above; the meso- and metapleuræ closely, coarsely rugosely punctured. The narrowed base of the 1st abdominal segment closely, coarsely punctured, the base of the dilated apical part less closely punctured, the punctures large and clearly separated. Pygidium stoutly keeled laterally on the apical half, inside of the keel is a furrow; the apex in the centre is shortly incised; the sides of the incision straight and oblique, narrowed to a sharp point behind. Male.

Length 14 mm.

February.

*Plesia interrupta*, sp. nov.

Black; the abdomen in the centre with a slight blue tinge, clypeus, mandibles (their apex piceous), a line on the base and apex of the pronotum, the greater part of the tegulæ, a mark, nearly twice longer than wide, and with its upper half obliquely narrowed behind, a trilobate line (the central lobe sharply pointed) on the apex of the 1st abdominal segment, a mark twice wider than long, and with the base rounded in the centre of the 2nd and 5th segment; a larger mark on the sides of the apex, its sides dilated largely backwards obliquely to near the base of the segment; and a curved mark on the sides of the last segment, yellow. Legs black, the tibiæ and tarsi yellow, largely tinged with fulvous. Wings hyaline; the stigma and apex of costa fulvous, the nervures black. Male.

Length 18 mm.

Head and thorax thickly covered with long white pubescence. Front and vertex closely rugosely punctured, the punctures running into reticulations; below the ocelli is a smooth, shining rounded tubercle. Clypeus strongly and moderately closely punctured, the middle not quite transverse. Pro- and mesonotum strongly, closely punctured; the middle of scutellum smooth; the post-scutellum coarsely rugosely punctured; the metanotum closely reticulated-punctured; pleuræ closely, distinctly, rugosely punctured; the base of the metapleuræ smooth and shining, this shining part being narrowed above, finely, closely longtitudinally striated at the base and more broadly below. Abdominal segments: the part behind the furrows smooth, the rest punctured, but not strongly or closely; the last segment is more strongly punctured, except on the centre of the apex, which is smooth; the apical incision is nearly as long as the width at the apex, towards which it becomes gradually wider. The ventral segments are marked with yellow, like the dorsal. Radial cellule long, lanceolate; the 2nd and 3rd abscissæ of radius equal in length, the 1st transverse cubital nervure broadly, roundly curved; the 2nd slightly roundly on the fore two-thirds, the smaller hind part straight, oblique: the 2nd recurrent nervure is received close to the 2nd transverse cubital; it is obliquely sloped outwardly to below the middle, then, to a less extent, inwardly, the angled being rounded; the transverse median nervure in hind wings broken shortly above the middle.

*Plesia leucospila*, sp. nov.

Black; the mandibles, underside of flagellum, tarsi and hind tibiæ bright red; the 2nd, 3rd and 4th segments of abdomen with a white spot, wider than long, on the outer side; wings hyaline, distinctly tinged with fuscous; the stigma and nervures black; the apex of radius rounded. Female.

Length 11 mm.

Shining, covered with white hairs, which are tinged with fulvous on the front. Head closely and distinctly punctured; the middle of vertex behind and sides of front anteriorly smooth. Pro- and mesonotum with scattered punctures; the

metanotum closely, finely, distinctly punctured, except in the centre at the base. Pleuræ almost smooth. Abdomen sparsely punctured; the pygidium thickly covered with short, thick rufous hair, except on the apex, which is rufo-testaceous. Apex of 4 anterior and the outerside of the posterior tibiæ thickly covered with bright red, bristle-like hair; the calcaria white. Clypeus transverse, piceous, the centre distinctly projecting; its apex not quite transverse. The 1st recurrent nervure is received shortly behind the middle; the 3rd transverse cubital nervure forms a broad, rounded curve, without any oblique slope.

*Plesia erythromota*, sp. nov.

Black; the prothorax and mesonotum bright red; the tarsi, apex of middle tibiæ and the greater part of the hind tibiæ rufous; a transverse white mark, wider than long on the sides of the 2nd, 3rd and 4th abdominal segments, white; the mark on the 4th wider than on the others, reaching close to the centre of the segment. Wings hyaline, suffused with fuscous; the stigma and nervures black. Female.

Length 11—12 mm.

Head, except in the centre of the vertex, closely and strongly punctured; the face and clypeus smooth. Apex of pronotum and apical two-thirds of mesonotum punctured, but not closely or strongly; the latter more strongly than the former. Base and centre of scutellum smooth, the rest with somewhat coarse, clearly separated punctures; in the centre is a curved, transverse white line. Metanotum finely and closely punctured; the triangular basal area smooth. Apical segments of abdomen punctured; the pubescence tinged with fulvous; the pygidium piceous at the apex; the pubescence black, mixed with shorter rufous bristles.

*Plesia incisa*, sp. nov.

Black, the clypeus, mandibles, except at the apex, a line on the apex of the frontal tubercles, palpi, a line on the apex of the pronotum and narrow lines, dilated in the middle and on the sides except that on the 1st,—on the apex of the abdominal segments, the 4 anterior legs below and the hind tarsi, below, pale

yellow; head, thorax and legs densely covered with white pubescence; the wings hyaline, the nervures and stigma black. Male.

Length 13 mm.

March.

Apex of clypeus transverse in the middle, the sides roundly curved and narrowed. Front and vertex coarsely, rugosely punctured, the pro- and mesonotum are less closely and less rugosely punctured, the punctures being clearly separated. Parapsidal furrows wide, shallow, striated. Metanotum closely, rugosely punctured, the apical slope more closely than the base; there is a smooth, irregular space in the centre of the basal part. Pleuræ coarsely, rugosely punctured, the base of the propleuræ lined with white. The narrowed basal third of the 1st abdominal segment almost smooth, the dilated pyriform apex closely punctured; there is a narrow transverse furrow near the base of the 3rd, 4th, and 5th, the incision in the pygidium is twice longer than wide, roundly narrowed at the base; the sides are not keeled. The 3rd abscissa of the radius is not much longer than the 2nd; the 4th distinctly longer; the 2nd recurrent nervure is roundly obliquely curved outwardly above; the lower part straight, oblique, slightly turned towards the base of the wings.

## SPHEGIDÆ.

*Notogonia rufoscapa*, sp. nov.

Black, the antennal scape bright red, darker at the apex above, the mandibles of a darker red, palpi dark fuscous, the body covered with a silvery pile; wings uniformly dark fuscous violaceous; the nervures and stigma back; 2nd cubital cellule much narrowed in front, half the length of the space bounded by the 1st transverse cubital and the 1st recurrent nervures are united, and are received near the apex of the basal third of the cellule; the metanotum minutely, obscurely transversely striated, the apical slope more distinctly, widely and irregularly striated.

The apical 3 joints of the antennæ are dark rufous; the long spur of the hind tarsi three-fourths of the length of the metatarsus. Third joint of antennæ not much longer than the fourth. Metapleuræ weakly obliquely striated. Metatarsus of fore legs with 3 long spines on the outerside; the tibial and tarsal spines of moderate length; the long claws have no tooth. The pygidium in the specimen described, whatever it may be in fresh examples, has no pubescence, and is pitted all over with little raised points. Female.

Length 12 mm.

December.

Characteristic of this species is the red scape, and the united recurrent nervures. It comes near to *N. ciliata*, Sm.; that species may be known by the fore tarsi being armed with numerous long stiff spines, longer than the joints, there being 5 on the metatarsus, by the 2nd cubital cellule being one-third of the length of the 3rd in front, very slightly more than the space bounded by the recurrent nervures, which are received not far from the base of the cellule; and the 1st recurrent nervure has not the front half obliquely bent as it is in *N. rufoscapa*.

*Ammophila dunbrodyensis*, sp. nov.

Length 19 mm. Male.

This species is very similar to *A. erythrospila*; it is a more slenderly built species; the red colouration on the thorax being present only on the lower half of the meso- and metapleuræ and absent from the apex of the metanotum, the 4 front legs are only very slightly marked with black, the occiput is broadly rounded, not transverse in the middle; and otherwise is easily separated from it, and from *A. dolichodera*, Kohl, by the 3rd cubital cellule being only one-quarter of the length of the 2nd.

Hind ocelli separated from each other by a slightly less distance than they are from the eyes. Clypeus about one-half longer than wide, its apex almost transverse. Pronotum broader than long, sparsely, weakly punctured. Mesonotum transversely rugulosely, but not closely striated. Metanotum closely, transversely rugulose. Pleuræ rugulose, thickly covered with white

pubescence. Tubercles large, round, reddish. Third cubital cellule short, in front hardly longer than the space bounded by the 2nd transverse cubital and 2nd recurrent nervures. The underside of the petiole and the greater part of the 3rd and 4th abdominal segments, rufous. The 4 front legs are light red; the trochanters and basal three-fourths of the femora black above; the hind coxæ, trochanters and femora, except at the apex, black, the rest of the legs of a darker red than the anterior.

*Stizus Johannis*, sp. nov.

Length 9-10 mm.

February.

Belongs to the group of *tridens*, having the same form and colouration. Median cellule in hindwings emitting only an anterior nervure. Lateral incision in sides of median segment large, twice longer than wide, rounded; the upper angle broad, rounder, the lower short, acute.

Black, covered with a closely silvery pubescence, the clypeus, face, lower inner orbits, opposite the antennæ, base of mandibles, a narrow, short line, near the top of the upper eye orbits, lower part of scape, the hind edge of pronotum, the line extending on to the tubercles, a small oval mark behind the latter, a line along the apical half of the sides of the mesonotum, a mark longer than wide on the sides of the scutellem, not quite reaching to the apex, a broad curved line on the post-scutellum, broad lines on the apices of the abdominal segments—the basal 2 broadly dilated backwards on the sides, and the apical 3 bordered with brown,—and fascial on the 2nd and following ventral segments—dilated laterally and in the centre. The 2nd cubital cellule not pedunculated, at the top separated by the length of the space bounded by the 2nd transverse cubital and 2nd recurrent nervures. The legs yellow, the coxæ, trochanters, a line behind on the 4 front tibiæ, one in the centre of tibiæ and the basal half of the hind femora, black. The flagellum of antennæ reddish brown, black above. Clypeus not clearly separated, densely pilose. Front and vertex shagreened. Thorax above closely, minutely punctured, as are also the basal segments of the abdomen.

The male is coloured like the female, including the antennæ ; the penultimate ventral segment is laterally, broadly, roundly incised. It wants the round spot on the pleuræ behind the tubercles. The eyes in both sexes strongly converge below ; the antennæ clavate, short. In the female the eyes near the face are separated by distinctly more than the length of the antennal scape ; in the male by very little more than its length. The wings in both sexes are clear hyaline ; the costa is testaceous.

## VESPIDÆ.

*Odynerus senex*, sp. nov.

Black, the clypeus, a mark, broader than long, above the antennæ, mandibles, except at the apex, underside of antennal scape, a spot on the innerside at lower side of the eye orbits, a short line on the upper outer eye orbits, the edge of the pronotum at the apex, tegulæ, the hinder part of the tegulæ tubercles, the sides of both scutellums and the apices of the abdominal segments, yellow, red are the base of the antennal scape above, the hinder part of the pronotum from near the base, the sides of the median segment, of the 1st abdominal segment and a large mark on the sides of the basal half of the 2nd, legs red, the outer side of the tibiæ and base of tarsi yellow. Wings fuscous, highly iridescent, the apex darker coloured and with a distinct violaceous tinge, the nervures and stigma black. Male.

Length 10 m.m.

Head and thorax strongly and closely punctured, the punctures above running into reticulations ; the abdomen are closely, but less strongly punctured ; the 2nd segment with a longitudinal keel down the centre. Antennæ stout, the underside of the flagellum brown ; its hook stout, reaching close to the base of the joint. Clypeus as long as its greatest width, strongly, but not closely punctured ; the central length of the apical incision not as great as the width at the apex ; the centre at the base is rounded ; the top of the clypeus is broadly rounded. Base of thorax transverse,

sharply angled laterally. Sides of scutellum largely raised into a keel or tooth ; its highest part is beyond the middle ; the basal and longer slope is straight, obliquely sloped ; the apical has a more rounded slope ; the sides of the post-scutellum rise into a prominent tooth, which is triangular as seen from behind ; its apex has a more rounded, dilated slope than the base. Sides of metanotum broadly rounded. Basal segment of abdomen cup-shaped ; the 2nd segment is as long as its width at the apex.

This species comes close to *O. Whiteanus*, Cam. ; probably the coloration differences between the two are not of much importance ; but there are structural differences between them ; *e.g.* the base of the thorax in *Whiteanus* is not so transverse, it being somewhat dilated in the middle ; the keel on the sides of the scutellum is less prominent, it being less prominent and not so high as that on the post-scutellum. the opposite being the case with the present species ; the post-scutellal keel on *Whiteanus* is more prominent, longer and more broadly and distinctly rounded above, its pterostigma testaceous, not black ; and there is no keel on the 2nd dorsal segment of the abdomen which is shorter compared with the width.

*Odynerus quadrituberculatus*, Sm. (Cat. Hymen. Ins. Brit. Mus. v, 70) from Port Natal appears to be related to the present species and to *O. Whiteanus*. The terms used by Smith for the scutellums "sub-dentate on each side laterally" can hardly be applied to the two species I have described.

*Odynerus erythrotomus*, sp. nov.

Black, the underside of the scape, mandibles except their teeth ; a small mark, wider than long, rounded and narrowed above, slightly incised in the centre below, clypeus, labrum, a short line above the middle of the outer orbits, a band on the apex of the pronotum, dilated laterally; a small spot on the sides of the scutellum, the greater part of the post-scutellum, a line on the apex of the 1st abdominal segment above, and a broader one on the 2nd, all round, yellow. Legs rufo-testaceous, the fore coxæ and trochanters, the base of the fore femora narrowly, the middle coxæ above, trochanters, femora to beyond the middle, the hind

coxæ, trochanters and femora to near the apex, black. Wings fuscous violaceous, the nervures and stigma black. Male.

Length 10 mm.

Head and thorax closely and strongly punctured, covered with a silvery pile. Thorax longer than wide, the base not transverse, being slightly roundly dilated in the middle, its sides bluntly rounded. Sides of metanotum broadly rounded. Scutellum not toothed laterally; the post-scutellum not flat, somewhat rounded, obliquely sloped. Clypeus about as wide as long, rounded above but with a slight projection in the middle on the top; the apical incision, rounded, distinctly wider than long. First abdominal segment cup-shaped, narrow at the base, becoming gradually wider towards the apex; the second slightly longer than its width at the apex, width at the apex, which is smooth and distinctly raised; the 1st and 2nd segments are closely, uniformly and strongly punctured; the 1st more strongly than the 2nd.

The post-scutellum is rounded behind. Antennal hook stout, curved, reaching to shortly beyond the base of the joint. The punctuation the mesonotum and scutellum runs into striæ. Tegulæ rufous, large.

Is allied, by the not transverse base of thorax, to *O. melanodontus*; that species should be readily separated by the raised sides of the scutellum, by the black teeth on the post-scutellum; and by the yellow bands on the apex of the 1st abdominal segment being dilated laterally. In Saussure's Work it would come in near *O. hottentotus (olim posticus)*. The head and thorax are more densely covered with white pubescence than usual.

*Odynerus O'neili*, sp. nov.

Black, largely tinged with ferruginous; the antennæ, vertex, outer orbits and legs ferruginous, the clypeus of a lighter ferruginous tint; the 2nd abdominal segment above light orange coloured; with a dark line, darker and dilated at the base and apex, down the centre; wings bright fulvous, the apex smoky violaceous from the end of the stigma. Female.

Length 17 mm.

March.

Front and vertex strongly, but not closely punctured. Clypeus longer than its greatest width, its sides obliquely sloped ; the apex narrow, transverse, depressed in the centre ; the top broadly rounded. Thorax closely, strongly rugosely punctured ; the base of pronotum broadly rounded and bordered by a distinct, sharply raised keel. Scutellum flat, on a level with the mesonotum, the post-scutellum slightly more raised, especially towards the apex ; its apical slope long, slightly oblique and sparsely punctured. Sides of median segment broadly rounded, the apex obscurely transversely striated, punctured round the edges. The lower part of propleuræ is only sparsely punctured. First abdominal segment cupshaped, broadly rounded at the base ; the 2nd segment barrel-shaped, clearly longer than the greatest width. The thorax is longer than usual, fully twice longer than wide ; the base of the 2nd abdominal segment is not sharply contracted and separated from the apex of the 1st.

The rounded and narrowed base of the thorax, bright fulvous wings and broad orange band on the abdomen makes this *Leiomotus*, with its large size for an *Odynerus*, easily recognised. The metanotum is more obliquely sloped than usual and has its face finely, closely, transversely striated. The species looks more like a *Polistes* than an *Odynerus*. The broad orange band reminds one of *O. punctum*.

## ANTHOPHILA.

*Sphecodes iridipennis*, sp. nov.

Black, the abdomen bright red, the wings fuscous violaceous, highly iridescent, the nervures and stigma black ; the hind wings with at least 9 hooks ; the first 5 separated from the 6th by a space and the latter from the apical three ; the flagellum of antennæ brownish beneath ; the basal two-thirds of the mandibles bright red. Female.

Length 7 mm.

Front and vertex closely, rugosely punctured, the punctures almost running into reticulations in places : there is a narrow fine

keel down the centre of the front on its lower half. Face closely rugosely punctured, its centre forming a raised triangle, with the apex above; the clypeus strongly, but not closely punctured; its apex fringed with fulvous hair. Labrum depressed in the centre, the sides forming 2 rounded tubercles. Mesonotum strongly, but not very closely punctured, with a central smooth depression, and with a smooth space down the sides. Scutellum strongly punctured; a smooth space in the centre of the basal half. Post-scutellum coarsely, closely longitudinally rugose. Base of metanotum coarsely, closely, longitudinally reticulated in the centre, the sides more closely, obliquely striated. Pleuræ coarsely, closely rugosely reticulated, as is also the breast. Legs black, the calcaria and the apical joints of the tarsi pale testaceous, as are also the tarsal spines; the hair on the tarsi inclines to fulvous; on the rest of the legs it is black.

*Sphecodes O'neili*, sp. nov.

Black, the antennæ, basal two-thirds of the mandibles, apex of clypeus, legs, basal segment of the abdomen and the basal half of the 2nd, bright red; wings hyaline, the nervures and stigma blackish; the hind wings with ten hooks in 3 divisions of 5, 1 and 4. Metanotum widely reticulated, the keels distinct, stout; the centre of the area with 2 large smooth spaces. Female.

Length 7 mm.

December.

Front and vertex closely, rugosely punctured, the former below the ocelli finely longitudinally striated; the raised part of the face finely, closely rugose; the clypeus strongly puunctured, the punctures clearly separated. Mesonotum closely, strongly punctured, a shallow furrow down the middle. Scutellum with the basal half only sparsely, the apical much more closely, punctured. Apical slope of metanotum closely, strongly punctured. Pleuræ: the upper part of the pro- almost smooth, lower, especially towards the apex, striated; the meso- irregularly reticulated-rugose, the apex finely and closely rugose; the meta- on the upper basal part obscurely, the lower more distinctly obliquely striated, the rest irregularly reticulated-striated. The

1st abdominal segment closely punctured ; the basal half of the 2nd more strongly, and of the 3rd still more strongly punctured ; the others smooth ; the pubescence white.

*Sphecodes capensis*, sp. nov.

Black, the apex of the 1st abdominal segment and the sides of the 2nd and 3rd segments broadly, red; the mandibles dark red before the apex ; wings clear hyaline, iridescent, the nervures and stigma blackish, the latter fuscous behind ; the hind wings with 8 narrow curved hooks. Male.

Length 6 mm.

Head thickly covered with longish white pubescence, the front and vertex closely rugose ; the clypeus more strongly, less closely punctured. Labrum smooth and shining ; a small rounded incision in the centre of the apex above. Mesonotum strongly, but not very closely punctured ; the base of scutellum sparsely, the apex, more closely punctured. Post-scutellum closely rugosely punctured. Base of metanotum closely, strongly, irregularly and somewhat obliquely striated. Propleuræ strongly, the meso more closely and less strongly reticulated, the apex above with some oblique striæ ; the metapleuræ wrinkled and bearing some striæ at the base. Basal 3 segments of abdomen closely and strongly punctured, the apex of the 2nd and 3rd depressed and smooth. Apical joints of tarsi and calcaria pale testaceous.

*Halictus Schönlandi*, sp. nov.

Black, the apical third of the 1st abdominal segment, the whole of the 2nd and the greater part of the 3rd red ; wings clear hyaline, the stigma fuscous, the nervures pale. Hair dense whitish cinereous. Female.

Length 5 mm.

Metanotal area closely, longtitudinally reticulated, more finely and closely at the apex than at the base, the sides with stouter, more widely separated oblique striæ. The hair on the face, clypeus and front is very dense, hiding the sculpture. Sides of mesonotum finely, closely and distinctly punctured, the centre more widely and strongly punctured. Apex of scutellum

closely, the base sparsely punctured. Calcaria pale testaceous; the hair on the innerside of the tarsi is rufous. The 3rd abscissa of radius is not much longer than the 2nd; the 3rd transverse cubital nervure is oblique in front, the hinder (and smaller) part is broadly rounded. Tegulæ piceous. Antennæ stout, the joints of flagellum almost moniliform. The apex of the metanotum is transverse in the middle above, its sides rounded. Only the base of the 2nd abdominal segment is depressed. There are no basal or apical fasciæ on the abdominal segments. Above the propleuræ is dilated into a triangular, large projection, which is bare below, above thickly covered with long white hair; it is as long as its width at the base, and becomes gradually narrowed towards the apex.

*Halictus dunbrodyensis*, sp. nov.

Black; the underside of the antennal flagellum and the greater part of the mandibles rufous; as are also the apical joints of the tarsi; the hair on head, thorax, abdomen and legs white; wings clear hyaline, the nervures and stigma black. Female.

Length 4-5 mm.

Metanotal area irregularly, finely obliquely striated. Clypeus strongly, but not closely punctured, the large punctures being widely separated. Centre of face finely and closely punctured. Mesonotum closely finely, but distinctly punctured, depressed in the middle; the base with a fine longtitudinal furrow. Abdomen impunctate. The hair on the underside of the tarsi rufous; the calcaria pale testaceous. The rima is testaceous laterally, its centre black. The hinder parts of the transverse cubital nervures are testaceous; the 3rd transverse cubital nervure is obliquely sloped in front, the rest broadly, roundly curved. Abdominal segments not depressed.

The propleural projection is large, the apex broad, rounded and clearly separated. On the base of the abdominal segments are bands of depressed pubescence.

## Notice of some new Fossil Reptiles from the Karroo Beds of South Africa.

By R. BROOM, M.D., D. Sc.

### *Dicynodon Jouberti*, n. sp.

At many places in the Gouph, skulls of a small species of *Dicynodon* are met with in considerable numbers. The S. African Museum possesses about a dozen such skulls from the Beaufort West district, presented in 1881 by Mr. J. R. Joubert, and one or two presented by Mr. J. M. Bain, also from near Beaufort West. The same species I have also found at Rietfontein in the Prince Albert district. The form is of interest, not only on account of our being able to compare a large series of specimens (nearly 20), but owing to its being apparently the first species of *Dicynodon* to appear in South Africa. At Rietfontein it occurs with *Titanosuchus*, and may thus belong to an upper zone of the *Pariasaurus* beds.

In the whole series of skulls there is very little difference in size, the largest being 110 mm. long, and the smallest a little over 90 mm. It is highly probable, therefore, that most of the skulls are adult.

The most noteworthy features of the skull are the following: the parietal, frontal and upper nasal are practically in one plane; the interparietal portion is about equal in breadth to the interorbital; and the jugal arch is unusally deep in the region of the postorbital bar, being at least as deep as the radius of the orbit.

The largest specimen, No. 695, may be taken as the type.

The antorbital portion of the skull is about equal in length to the antero-posterior diameter of the orbit. In the type it measures 32 mm., and in two other specimens 30 mm. The nostrils are fairly large, and the premaxillary meets the nasals at the upper border of the nostril. The nasals are of large size, and in one

well preserved specimen measure 24 mm. in length. They are distinctly convex, but do not form supranasal protuberances such as are frequently present in *Anomodonts*. The maxillary bone is somewhat quadrangular in shape. In the type specimen it contains a large tusk which is directed downwards and forwards; where it leaves the bone it measures 7 mm. in its antero-posterior diameter. A considerable number of the specimens have tusks of similar size, but a number of others have slender tusks of from 4 to 5 mm. in diameter. The small tusked forms are apparently as mature as the large tusked forms, and we are probably justified in regarding the difference as sexual. The small tusks are directed downwards and forwards, exactly as are the large ones.

The orbit in the type specimen measures 29 mm. antero-posteriorly and 28 mm. vertically, and the interorbital width is 21 mm. Immediately below the orbit the jugal bone measures 5 mm. in depth, but it becomes rapidly deeper on passing backwards, and at the post orbital bar it measures 17 mm. Here it is overlapped by the squamosal which is about as deep. The jugal passes back behind the squamosal as far as the plane of the parietal foramen. There is a well-developed preparietal bone.

The lower jaw has the angular with the remarkable fan-shaped expansion seen in well-preserved *Oudenodon* skulls. This is a character which will probably be found in all *Anomodonts*, though usually lost in museum specimens.

*Procolophon Baini*, n. sp.

This new species is founded on a specimen discovered by Mr. T. Bain, and presented to the South African Museum by his son Mr. J. M. Bain. The specimen is in a matrix of soft grey sandstone; its locality is unfortunately unknown. It consists of the fairly well preserved skull, the left scapula, the left manus and pes, radius, ulna, tibia and fibula, a few ribs and abdominal ribs.

The skull is chiefly remarkable for the complete absence of a quadrato-jugal horn. There are 4 premaxillary teeth and 8 maxillary; and in the lower jaw probably 11. In *Procolophon trigoniceps*, to which species I am inclined to refer all the skulls

I have seen from Tafelberg and Donnybrook, there are rarely more than 3 premaxillary teeth and never more than 7 maxillary, or 9 mandibular teeth. The 4 premaxillary teeth measure 7.2 mm., and the 8 maxillary 15 mm. The premaxillaries are fairly similar to those in *P. trigoniceps*, but the nasals are considerably more convex. The other bones of the skull are very much like those of the better known species, except that the quadrato-jugal is a comparatively small bone, and the postorbital fairly well developed. There is no temporal vacuity. The small temporal vacuity which has been described and figured in the British Museum type of *P. trigoniceps* has, I am inclined to think, been artificially produced; if it has not, then it is only exceptionally present. Among the large series of skulls in the Albany Museum there is only one which might support the idea of there being a lateral vacuity, and in all perfectly preserved specimens the temporal roof is seen to be without any opening.

*Archæosuchus Cairncrossi*, n.g. et n. sp.

Hitherto the Ecca beds have been conspicuous for the absence of reptilian fossils. *Mesosaurus tenuidens* occurs in the Upper Dwyka shales, and possibly in those of the lower Ecca, but with this possible exception no vertebrate remains have been found throughout the 2,600 feet of Ecca shales and sandstones. Within the last month Mr. J. L. Cairncross, while engaged in boring for water in the Prince Albert district, about 10 miles north-west of the township, was fortunate in discovering some reptilian bones in a clay pellet conglomerate bed which probably belongs to the lower Ecca series.

The most satisfactorily preserved specimen is the right maxillary bone of a large carnivorous reptile. Unfortunately the matrix is too hard to allow of much in the way of development, but the alveolar margin and the palatal surface are satisfactorily displayed.

In front there is a large canine tooth of which unfortunately the greater part of the crown is lost. The antero-posterior diameter of the tooth at its base is probably about 25 mm. Where

broken across it measures 20 mm. by 15 mm. It has so far as preserved no indication of serrations. The root is of large size and has very little of a pulp cavity. About 25 mm. behind the canine is a small molar ; it is a simple and apparently unserrated tooth, which measures about 11 mm. by 7 mm. About 5 mm. behind the 1st molar is a second of about equal size. A considerable part of the crown is preserved. The antero-posterior length at the base is 8.5 mm., and judging by the contour of the sides the crown was probably about 13 mm. high. There is a slight indication of a posterior ridge on the tooth. The third molar is about 11 mm. behind the second, but is quite small and very imperfectly preserved. The fourth which is 22 mm. behind the second is very similar to the second. Its antero-posterior length is 11 5 mm., and its estimated height 17 mm. Towards the point there is a slight posterior ridge, and the base of the tooth is somewhat thickened. The fifth tooth is apparently missing. The sixth is, however, well preserved. It is situated 24 mm. behind the fourth and is less curved. Its antero-posterior measurement is about 11 mm. and its height 13 mm. From the base it slopes rapidly to the point, and there is a small ridge along the anterior side of the tooth. The upper half of this ridge, except apparently near the very point, is distinctly but feebly serrated. The eighth molar is shorter and stouter than the seventh and situated only 4 mm. from it. Its antero-posterior length is probably about 12 mm. and the height about the same. It also shows a small anterior serrated ridge.

The whole length of the dental series from the canine to the eighth molar is 152 mm., and the greatest length of the maxlllary bone as preserved 197 mm. It is unfortunately impossible with the appliances at my disposal to satisfactorily develop the bone and it is very doubtful if much further information would be gained. The palatal portion leads one to believe that the palate was probably of a *Rhynchocephalian* type. If the tooth bearing portion of the maxillary is complete, then it must have been shorter than the upper portion of bone. In any case the animal probably had a fairly long skull.

It is quite impossible from the remains to say whether the animal was a *Therocephalian* or not. The structure of the canine closely resembles that of the *Dinocephalian*, such as *Titanosuchus*, but the molar teeth are very different. There is no resemblance to the *Pelycosaurs* of America. Provisionally it may be safest to place *Archæosuchus* among the *Therocephalians* till further remains are found. At present the earliest *Therocephalians* occur in beds which are apparently upper Permian, whereas the horizon of *Archæosuchus* is probably very much lower, and in beds which are probably either middle or lower Permian.

*Pelosuchus priscus*, n. g. et n. sp.

This new genus and species is founded on the remains of a large fossil reptile discovered by Mr. P. H. du Plessis on the farm Bokfontein, Prince Albert district. Most of the remains have been badly weathered and broken, and some which it was inconvenient to remove are still in the rock. The only portions of the skull that have been found are the front of the right dentary, and a portion of the palate, but of the skeleton there have been secured a number of well preserved vertebræ, portions of the shoulder girdle and pelvis, some ribs, a moderately complete femur and many fragments of other long bones not yet identified.

The dentary is very badly weathered and the teeth are lost with the exception of three roots. The portion preserved measures about 140 mm. It shows the symphysis in a fair state of preservation, and judging by the position of the symphysis to the ramus we may infer that the two rami made with each other an angle of about 60°. In general appearance the portion of jaw is not unlike that of a crocodile and differs from jaws of Therocephalians or Dinocephalians in that the teeth cannot be distinguished as incisors, canines or molars. There are in the specimen the remains or sockets of 8 teeth. Of these the first five, represented only by the sockets, have been large, the first being apparently largest and the others gradually decreasing in size. The length of jaw occupied by the first five teeth has been about 100 mm. The socket of the third tooth measures 12 mm. anteroposteriorly and 17 mm. transversely, and the distance between the third and fourth tooth has

been 11 mm. Behind the fifth tooth are the remains of three smaller teeth which differ from the anterior in having so far as can be seen no distinct sockets. They seem to be lodged in a grove like the teeth in *Ichthyosaurus*. The 6th tooth measures antero-posteriorly about 11 mm., the 7th, 8 mm, and the 8th, 7 mm.

The vertebræ are unlike those of any S. African Permian reptile hitherto discovered. The bodies are bi-concave but not deeply concave. In some the transverse processes are very large and pass upwards and outwards as in some of the vertebræ of *Belodon*. In other vertebræ the transverse processes pass outward and downward as in the Pelycosaurs. The coracoid is of large size and from the appearance of it, one would infer that there had also been a large precoracoid.

At present it is impossible to definitely assign *Pelosuchus* to its true position, but there seems much more evidence for placing it in the Diapsidan phylum than in the Synapsidan. Had it been found in Triassic rocks one might have been inclined to regard it as a primitive Phytosaur. Being a Permian reptile its affinities may possibly be more with the Pelycosaurs. The vertebræ are not unlike those of *Anomosaurus* recently described by v. Huene and regarded by him as a Pelycosaurian. Provisionally *Pelosuchus* may be placed among the Diaptosaurians, and not unlikely it may prove to be the representative of a new suborder.

*Erythrosuchus africanus*, n. g. et n. sp.

Some years ago Mr. Alfred Brown of Aliwal North discovered the remains of a large reptile in Upper Beaufort beds at Kraai River. The bones were believed to be those of *Euskelosaurus* and were presented by Mr. Brown to the S. African Museum. On development however it was found that they were quite unlike the bones of Dinosaurs, and belonged to an animal of quite a different order. The bones are in good preservation and comprise the practically perfect pelvis, shoulder girdle, humerus, radius and ulna, a number of vertebræ and various fragments of other bones.

The pelvis at once suggests a comparison with *Belodon*. The ilium which is figured by v. Meyer as that of *Belodon* is so strikingly like the ilium of this S. African animal that, had no other bones been found, the remains would probably have been referred

to a species of *Belodon*. The other bones however are not very like those of *Belodon*. The pubis and ischium are really modifications of the plate-like type, and form a continuous symphysis with those of the opposite side. The pubis is curiously twisted. The upper part of the symphysis is in line with that of the ischium, but a little above the middle of the bone the symphysis turns abruptly down, making almost a right angle with the upper part, and causing the greater part of the pubis to be directed downward. There is a well developed pubic foramen which extends almost with the suture between the ischium and the pubis. The ischium is a flattened bone which differs from that of *Belodon* in having the posterior part almost as broad as the anterior.

The shoulder girdle has a very large scapula with a broad upper end, and a very small rounded coracoid with a large coracoid foramen.

The humerus is unlike that of *Belodon* in being much broader at both the upper and lower ends, and in having the delto-pectoral ridge much better developed.

The vertebræ best preserved are probably lower dorsal. They have the centra constricted, and are only feebly biconcave. The transverse process is of moderate size and gives an imperfectly directed articulation to the head of the rib. The rib is really single-headed, as, though there are two large articular surfaces, there is a slight connection between the two.

One small dermal ossification has been found, but it shows no evidence of pitting or other ornamentation.

The following are some of the principal measurements :—

| | |
|---|---|
| Width of lower end of ilium ... ... | 205 mm. |
| Length of ischium ... ... ... | 310 mm. |
| Greatest breadth of ischium ... ... | 230 mm. |
| Length of humerus ... ... ... | 307 mm. |
| Width of top of humerus ... ... | 230 mm. |
| Width of bottom of humerus... ... | 190 mm. |
| Length of scapula ... ... ... | 485 mm. |
| Width of top of scapula ... ... | 205 mm. |

There seems little doubt that *Erythrosuchus* is one of the *Phytosauria*. The beds in which it occurs are believed to be Upper Triassic.

## On a species of *Coelacanthus* from the Upper Beaufort Beds of Aliwal North.

By R. BROOM, M.D.

In the collection of Mr. Alfred Brown, of Aliwal North, are two fragments of a *Coelacanth* fish from the lower Caledon River district. The larger fragment consists of the well preserved tail, and caudal region as far forward as the base of the second dorsal fin. And this specimen may be regarded as the type. The other specimen is evidently the second dorsal fin of a somewhat larger animal. It is thus just possible, though rather unlikely, that the second specimen belongs to a second species.

The tail specimen, which may be taken as the type, is evidently a portion of a rather elongated medium-sized species of *Coelacanthus*. In front of the anterior portion of the principal caudal fin the body is slightly constricted and measures 23 mm. in depth. From the narrowest portion to the tip of the supplementary tail measures 62 mm. The principal fin is formed of 16 rays above and 14 below, the average length of the rays beyond the region of the scales is 20 mm. and the distal half of each ray is articulated but not broader than the proximal unarticulated portion. From the posterior end of the principal caudal fin to the tip of the supplementary fin is 26 mm. The supplementary fin has 13 rays as preserved (possibly another is missing from the tip), all of which are unarticulated.

There is preserved what is apparently the base of the anal fin, which is situated 72 mm. in front of the tip of the tail. The posterior dors l fin must be rather further forward. The arrangement of the internal skeleton is as in typical *Coelacanths*.

The scales so far as preserved have been ornamented by fine slightly wavy antero-posterior fine ridges of ganoine.

The second specimen which I believe to be the posterior dorsal fin, is most probably of the same species, but belongs to a slightly larger individual. The fin is very markedly lobate, the lobe being 12 mm. in length and about 6 mm. broad near its base. The fin has 20 rays of which the first 4 and the posterior 3 are short. The longer rays at least are articulated in more than their distal half.

The scales in this second specimen are similar to those in the type.

For this African species I propose the name *Coelacanthus africanus*. The beds in which it occurs are believed to be upper Triassic.

In the same beds are a species of *Hybodus* and another small shark of a different genus. The only remains, however, at present known are very imperfect.

*Calamagrostis* (Subg. Deyeuxia) *Huttoniae*, n. sp.

Auctore E. HACKEL. [1]

Culmus in parte superiore (sola quæ in specim. adest) te[illegible]es glaberrimus apice breviter nudus. Folii summi vagina laxiuscu[illegible]la scabra, ligula oblonga obtusa fissa circ. 6 mm. longa, lamina linea[illegible]is acuta circ. 12 cm. longa 3 mm. lata, scaberrima, nervis crassiuscu[illegible]lis percursa. Panicula lineari-oblonga, patula, densiuscula, suberec[illegible]ta, 18-24 cm. longa, 3-4 cm. lata, rhachis scabra, ramis semiver[illegible]rti-cillatis 6-8 tenui-filiformibus v. subcapillaribus erecto-patu[illegible]alis scaberrimis in ½ inferiore nudis dein ramulos secundarios pluri[illegible]-v. multispiculatos gignentibus, spiculis secus ramos aequalit[illegible]ter dispositis densiusculis breviter pedicellatis, pedicellis api[illegible]ic clavatis scaberrimis. Spiculæ lanceolatae 3 mm. longae palli[illegible]lid virides; glumae steriles subaequales (I. paullulum major) lance[illegible]ec latae (3 mm. longae, expansae 1·5 mm. latae) acutissimae 1-nerve[illegible]ve carina aculeolato-scaberrimæ; gluma fertilis sterilibus paul[illegible]ull brevior (2·5 mm. longa), oblonga obtusa apice minute 4-denticula[illegible]lat tenui-membranacea 3-nervis dorso glaberrima, callo pilis dens[illegible]nsi ipsam glumam subaequantibus circumcirca obsita, mutica v. ra[illegible]ar in ⅓ superiore aristulam rectam ipsam vix superantem eden[illegible]ns; palea glumam subaequans oblonga obtusiuscula bidentu[illegible]-ula bicarinata glaberrima. Antherae fere 1 mm. longae. Rhachillae pr[illegible]ro-cessus circ. 0·5 mm. longus, pilis 2 mm. longis dense barbatus.

Natal. Shafton, Howick, Mrs. H. Hutton, n. 384.

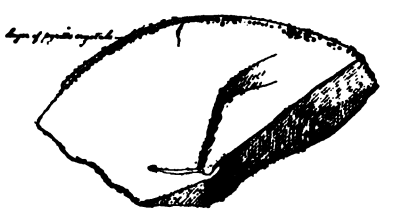
Affinis *C. emirnensi*, Hack. (*Deyeuxiae emirnensi*, Bake[illegible]er) in ins. Madagascar crescenti, quae vero differt glumis sterilib[illegible]us lineari-lanceolatis, fertili steriles subæquante paullo infra apice[illegible]em bidentulum aristam rectam circ. 2 mm. longam exseren[illegible]ti, rhachillae processu nullo. Baker hanc speciem Deyeux[illegible]iis adscribit, sed in descriptione nullam rhachillae processus m[illegible]n-tionem fecit, neque ego in speciminibus a Hildebrandt (n. 4010) et a Scott-Elliott lectis hujus processus vestigium inveni.

(1) Compare p. 113.

Note on a quartzite boulder from the Molteno sandstone.

By E. H. L. SCHWARZ.

In going over the geological collection in the Albany Museum, ich has been recently entrusted to my charge, I have found tion of a quartzite boulder from the Molteno sandstone, No. from Modder Poort in the Stormberg, presented by Mr. E. J. an. The substance of the boulder is quartzite, and it is of a d that is of common occurrence in certain zones of the Molteno s, especially near the coal seams. Green (1) notes boulders of nature exceeding the size of a man's head; Molyneux (2) men-



ion of a boulder from the Molteno sandstone, Modder Poort, showing tes crystals just below the original surface. About half natural size. Albany Museum, Rock collection, No. 45.

s them occurring not only in the sandstones above the coal, in one case, at Indwe, in the parting between two seams of l. The latter author says the boulders are of exactly the same position and condition as the quartzites (Table Mountain es) of the Zwartebergen. Dunn (3) says that the conglomerate ariably covers the coal seams, although coal is not necessarily nd beneath, that is to say, the conglomerate beds are more sistent than the coal seams; the boulders are principally of

Report on the coals of the Cape Colony, 1883, p. 7.
Report on the geology of the Karroo and Stormberg, 1881, p. 21.
Report on the Stormberg Coal Field, 1878, p. 17.

quartz-rock, but hard dark-brown sandstones of the older formations are also present. Some boulders weigh two or three hundred weight each. Dunn also notes that many of the boulders which are perfectly rounded by attrition, are frequently deeply bitten into on the surface by crystals of pyrites; sometimes the boulder is pitted all round, at others one side is more deeply eaten into than the other; where this alteration occurs the matrix is highly ferruginous, and the field evidence leaves no doubt that there has been actually a replacement of the silica of the boulders by iron pyrites as they lay *in situ* in the rock. In 1896 I collected specimens of these pitted boulders from above Vice's seam one of Dunn's localities, and they are now exhibited in the South African Museum. Dunn's explanation of the chemical replacement of silica by iron pyrites was perfectly sound, but does not seem to have been made use of. The specimen that I now wish to describe carries us one step further, and raises the whole question of the solubility of silica at the temperature and pressure existing at the earth's surface.

The specimen, No. 45, shows a stratum of pyrites crystals, or rather the casts of such crystals, for the boulder has been weathered about an eighth of an inch beneath the surface, the substance of the remainder of the boulder being unaffected, and the original water-worn surface still in its original condition except where occasionally a pyrites crystal has pierced it from the inside. We have, then, evidence for the transfusion of mineralising waters, that is to say, there has been a suction to within the boulder, through the capilliary interspaces between the quartz grains, of water containing iron sulphide in solution, and there has been a corresponding outflow of moisture carrying silica in solution. The silica is probably dissolved and simultaneously replaced by pyrites, molecule by molecule. Under such conditions we can calculate the change in volume from the original quartz grain to that occupied by the pyrites, according to the law stated by Van Hise, (4) which is, "that the volume of the original compound is to the volume of the compound produced directly as their molecular weights, and indirectly as their specific gravities"

(4) A treatise on metamorphism, 1904, p. 209.

The molecular weights and specific gravities of the two minerals are as follows: –

| | Molecular weight. | Specific gravity. |
|---|---|---|
| Silica | 59.94 | 2.65 |
| Pyrites | 119.26 | 5.025 |

The compound proportion is therefore :—

$$V : V^1 :: \frac{59.94}{2.65} : \frac{119.26}{5.025} = 22.6 : 23.7$$

or the volume of the pyrites is much greater than that of the silica which it replaces. The formation of these pyrites crystals will tend to split the boulder, and only in exceptional cases, as in the Albany Museum specimen, will the outer rind of unaltered quartzite remain affixed. The deposition of a stratum of crystals beneath the surface will, therefore, mean that in most cases the outer covering will peal off and reveal the crystals as apparently covering the rolled surface, and it is a point of great interest to see whether this does not actually happen in the field, and that Dunn's record of the boulders only being affected on the surface may be only true as regards their present and not their original surface. It is hard to explain just why the crystals form below the surface and not on it, but it is often the case with the transfusion of solutions that a wall is necessary to act as an intermediary in much the same way as a membrane is necessary for osmosis. The special importance of the Albany Museum specimen is to prove that the pyrites crystals do actually form in this position.

Since Bischof demonstrated experimentally that silicates are decomposed by alkaline carbonates at ordinary temperatures and pressures (5) with solution of silica the solubility of silicates and quartz at temperatures and pressures existing at the surface of the earth has become more and more recognised. We look to this fact to explain the violent bends and contortions which sandstone strata assume without any sign of shattering. Examples of this are well shown in the Cape Colony in the Witteberg and

(5) Bischof. Elements of Chemical and Physical Geology, English translation, 1854.

Table Mountain series, and the process by which the bending is accomplished, is that, when pressure comes upon a bed, the grains of the sandstone adapt themselves by the parts under stress dissolving, and the material being redeposited where there is strain, so that each grain accommodating itself without loosing its individuality, the whole stratum gradually assumes a new form without showing any break in its continuity.

Another striking instance is the replacement of pebbles in the Johannesburg banket by calcite, as explained by Mr. Kuntz (6). The quartz of the pebbles is entirely removed in the neighbourhood of a spring carrying lime in solution, and its place taken by calcite, so that there are produced limestone pebbles ; the impossibility of these latter being original is pointed out by the author.

In the report on Prieska, Mr. Rogers and myself described a peculiar dyke of quartz and felspar in the limestone series (7), a portion of which was presented to the Albany Museum, and forms specimen No. 9 of the rock collection. The dyke is for more than half its bulk occupied by limestone, and I think this is probably a case of an original pegmatite dyke in which a good deal of the quartz has been subsequently eaten out and replaced by limestone.

Replacement of silicates and quartz by pyrites is recorded by Purington in the Berezovsk district in Russia, near Ekaterinbourg, (8) where a large area of granite has been converted into what Karpinski has termed "berezite" (9), a rock consisting of muscovite, felspar and quartz, with a mixture of secondary pyrites carrying gold.

Suppose now that a boulder of quartzite, such as the Albany Museum specimen, had lain for a very long time in a matrix through which water containing iron pyrites in solution, or rather capable of depositing iron pyrites, was continuously passing, it is not speculating too freely to imagine that the quartzite boulder would become in the end a nodule of iron pyrites. In the Johannesburg banket, a much older formation than the Molteno beds,

(6) Transactions S.A. Geol. Soc., vol. VI, p. 74.
(7) Ann. Rept. Geol. Comm. for 1899, p. 78.
(8) Engineering and Mining Journal, June 13, 1903.
(9) Compte Rendu, Congrès Geol. International, 7 ième session, St. Petersburg, 1897, p. CCIX.

we find precisely pyritic nodules which, where the quartz pebbles are large, are of the same size, and where the banket is gravelly, the nodules become of buck-shot size. Drs. Hatch and Corstorphine ascribe the origin of these pyritic nodules to growth by accretion, but the authors do not explain how the space for their growth was produced (10). The more probable explanation of these pyritic nodules is that they are quartz pebbles replaced by pyrites in the same way as they are replaced elsewhere by calcite. It is remarkable that these pyritic nodules are said by the above authors to consist of marcasite, a mineral identical in composition with pyrites, but the crystalline form of which occupies 3 per cent. more space than pyrites; seeing the increase of space required for the replacement of quartz by pyrites, it seems unaccountable that the iron sulphide should assume a crystalline form which requires still greater space.

Finally, we have to trace what becomes of the silica that has gone into solution, and an examination of the sand grains of the sandstone matrix at once reveals the secret. The Molteno sandstones generally are characterised by the great brilliancy they possess when the sun shines on them, a fact noted by Darwin in sandstones of the same age in Australia; from this fact Dunn called them "glittering sandstones." If a few grains are put under the microscope, some of them will show perfect crystalline faces, and on a closer examination it will be seen that inside the quartz crystal there is the original sand grain, rounded, and with all its little quota of dirt still adherent. In other words, the silica from solution has been deposited round the sand-grains, and has built up new, perfect crystals on the old foundations, and it is the faces of these rejuvenated crystals that glint and shine on the rock surface.

(10) The Petrography of the Witwatersrand Conglomerate. Trans. S.A. Geol. Soc., Vol. VII, p. 141.

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## VOL. I.

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The South African Tortoises of the genus *Homopus* with description of a new species. By J. E. DUERDEN.

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Cape Colony.

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# South African Palæozoic Fossils.

By E. H. L. SCHWARZ, A.R.C.S., F.G.S.

In bringing together the fossils contained in the Albany Museum to form a stratigraphical series for display, I found a great number which could not be referred to known species; as they were undoubtedly new, it was decided to publish them. In the present instalment I figure and describe the fossils of the Bokkeveld and Witteberg Series, a group of forms in which I have been long interested; most of the new species described by Messrs. Reed and Lake were collected by myself. My first work on the Geological Survey of the Cape Colony was to try and find definite zones in the rock strata in the Western Province, and naturally I sought for the life forms in them to guide me. The result was published in abstract in the Annual Report of the Geological Commission for 1896, and a full account in the same report for 1905. The original account, however, has never been published. As far as the zones in the Bokkeveld and Witteberg beds were concerned, there was nothing definitely decided by my work, although the sequence of the larger rock groups was firmly established; three years later, therefore, I again made a determined effort to recognise zonal fossils, and searched for Bokkeveld fossils in Ceres and the Gamka Poort in Prince Albert. In the latter place I was able to collect a large number of species, and to measure each successive bed, one by one; yet I again failed to establish any zonal arrangement of forms. One is tempted to describe life provinces within the beds: noting that the *Homalonotus* predominates in the western and northern outcrops of the Bokkeveld series, the

*Spirifers* in the central, and the ornate *Phacops* in the eastern outcrops; in the Witteberg beds, too, one can point to a far greater prevalence of plant remains in the east. But in reviewing the evidence as a whole, and considering the fewness of the localities from which fossils have been obtained, and the enormous thicknesses and extent of strata that lie hid beneath the soil and debris I feel it unsafe to make any statement on the subject of either the zones or the life provinces. It is impossible to compare conditions of things in a country like South Africa with those obtaining in Europe or America, because the opportunities for study are so different. There the progress of civilisation has caused road and railway cuttings to be made in all directions, and the arts have been the means of opening up innumerable quarries, all these forming abundant exposures for collecting fossils.

Owing to the limited funds available, it was at first intended to issue the descriptions without illustrations, but the pen-and-ink sketches made while I was working out the forms are here reproduced; and although the method does not admit of the inclusion of the minute details which lithography allows of, it is hoped that these reproductions will enable readers to recognise the forms portrayed.

## PLANTÆ.

I have included the Witteberg plants in the Albany Museum in this description of South African Devonian fossils, because I find in them certain affinities with upper Devonian species, as well as with lower Carboniferous. The Witteberg beds have been usually classed as Carboniferous on account of their coming above Devonian marine beds—the Bokkeveld beds—and below the Dwyka series, which is thought to be Permian in age. The question of the correlation of the Witteberg beds, has recently been made urgent by the publication by Prof. Emile Haug of many palæontological works on the Sahara; there he finds Devonian rocks of a distinctly American type, including the

South African species *Homalonotus herscheli* and *Leptocœlia flabellites*; above these come sandstones, with *Lepidodendron lycopodioides*, Sternb., *L. obovatum*, Sternb., and possibly *Omphalophloios anglicus*, Sternb., all forms of upper Carboniferous age.* If my determination of an upper Devonian or lower Carboniferous age for our Witteberg beds is confirmed, there will be established a very important difference between the North Central and South African beds succeeding the lower Devonian.

There is another point which is brought out by the Witteberg fossils. In the lower Devonian species there are many identical with North and South American forms, but none comparable with those occuring in the Australian Devonian. In the Witteberg beds, on the other hand, the resemblances to South African species are to be looked for in Australia, Europe and North America. The unsatisfactory nature of the South African Witteberg fossils prevents us, however, from drawing definite conclusions from this fact in regard to the shifting of the barriers between ocean basins.

The forms with which we have to deal are in the following list, and I place beside them the species most nearly allied that I can find in Europe, America, and Australia. The list must be understood to refer only to specimens I have actually handled and examined. There are a large number of other forms mentioned by Feistmantel[1] with which I am unable to deal, owing to want of access to literature. When the Kowie plant beds are properly investigated, I have no doubt that a large number of additional forms will be discovered; I have already obtained from a new locality some *Knorria* stems, and some true *Sigillarias*, but I have not yet sufficient material to deal with them satisfactorily,

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*Comptes Rendus, 1905, CXL., p. 957

[1] Uebersichtliche Darstellung der Geologisch-palaeontologischen Verhältnisse Süd-Afrikas, Abh. d. Königl. Böhm. Ges. d. Wiss, VII, Bd. 3, p. 25.

## LIST OF SOUTH AFRICAN PLANTS WITH THEIR NEAREST FOREIGN ALLIES.

| SOUTH AFRICA. | EUROPE | AMERICA. | AUSTRALIA. |
|---|---|---|---|
| *Spirophyton sp. a* | *S. eifelense*, Kayser. Devonian, Germany. | *S. cauda galli*. Vanuxem. Devonian, Maddison Co. | *S. cauda phasiana*, M'Coy. Silurian, N. S. Wales. |
| *Spirophyton sp. b.* | | | |
| *? Archæopteris sp.* | *A. hibernica*, Haughton. Upper Devonian, Kilkenny and Berwick. | *A. obtusa*, Dawson. Upper Devonian, New York. | *A. howitti*, M'Coy. Upper Devonian, Victoria. |
| *Lepidodendron albanense, n. sp.* | | *Leptophlœum rhombicum*, Dawson. Upper Devonian. | *Lepidodendron nothum*, Unger. Upper Devonian, N. S. Wales and Queensland. |
| *Lepidodendron kowiense, n. sp.* | *L. tetragonum*, Geinitz. Carboniferous, Saxony. | *L. gaspianum*, Dawson. Upper Devonian. | *L. australe*, M'Coy. Lower Carboniferous, Victoria. |
| *Bothrodendron irregulare, n. sp.* | *Cyclostigma kiltorkense*, Haughton Devonian, Ireland. | *C. kiltorkense*, Haughton. Upper Devonian, Bear Ireland. | *C. australe*, Feistmantel. Lower Carboniferous, N. S. Wales and Queensland. |
| *Bothrodendron cæspitosum, n.sp.* | *Cyclostigma*, Haughton. Devonian, Ireland. | | *Cyclostigma sp.*, Feistmantel. Devonian, N. S. Wales and Queensland. |
| *Didymophyllum expansum, n.sp.* | *Didymophyllum sp.* Goeppert. Lower Carboniferous, Silesia. | *Didymophyllum reniforme*. Middle Devonian, New York. | |

### *Spirophyton.*

Mr. Seward has pronounced this fossil to be probably of mechanical and not of vegetable origin[1], but the South African form is so definite that it is hard to assent to this. The thallus, supposing it to be an alga, is wound round on a central stem which has a definite root; the thallus has clearly marked sickle-shaped ribs, and is bordered by a well defined rim; it is folded over itself in places, just as a thin membrane floating in water would be folded, if laid down on a flat surface. Besides this, a form consisting not of broad thin leaves, but of long rounded rods wound round a central axis, screw-wise, exactly as in the common kind, was found by Mr. Rogers and myself at Touw's River, in beds which near by have yielded the ordinary *Spirophyton*; this, however has been pronounced by Mr. Seward to be probably the root of some tree. The material in the Albany Museum does not admit of any further statement as to the nature of this problematical fossil, but I use the expressions *Spirophyton sp. a* and *S. sp. b.* to denote the two forms which this screw-like structure presents.

I have compared the South African *Spirophyton sp. a.* with specimens of an almost identical form from the Devonian of the Eifel, called by Kayser *Sp. eifelense*,[2] and I cannot see how these markings could be produced by stirring sand in water, as Potonié states,[3] seeing that the "thallus" winds regularly through several centimetres of rock.

The Howison's Poort specimens occur in a micaceous sandstone coloured grey with carbonaceous matter, and there is a possibility that some specimens showing definite structure may be obtained from this locality.

I have been unable to examine the American form *Sp. cauda galli*, Vanuxem[4] from the Cauda-galli grits of Madison, or the *Sp. cauda phasiana*, de Koninck[5], from Duntroon, New South Wales, the first from Devonian strata, and the second apparently

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[1] Ann. S. A. Museum, Vol. IV., pt. 1, 1903, p. 103, Pl. XIV., figs. 1 & 2.

[2] Neue Fossilien aus dem Rheinischen Devon, Zeit. deutsch. Geol. Ges. Vol. XXIV, 1872, p. 691.

[3] Lehrbuch der Pflanzenpalaeontologie, Berlin, 1892, p. 691.

from Silurian. It is remarkable that in Europe, America, Australia and South Africa this doubtful fossil occurs in beds approximately the same age, and this by itself is presumptive evidence in favour of its organic origin.

It was this impression found by me in quartzites near Brand Vley, Worcester, that led me to discover the *Gangamopteris-Glossopteris* bearing beds north of the town of Worcester, which had previously been mapped as Malmesbury or Bokkeveld beds, and eventually to establish the great Worcester-Swellendam fault, a drop of over 10,000 feet south of the Langebergen; in spite of its doubtful organic origin, it has ever since then been a most useful zone fossil.

Cat. Nos. 2329-2334. Witteberg beds. From first kloof on the right in Howison's Poort. Donor: Mr. C. B. Surmon, 1902.

Cat. No 2335. Witteberg beds, Bay of Biscay, Port Alfred. Donor: Mrs. H. M. Barber, 1902.

### (?) *Archaeopteris.*

Some pinnules of a fern shaped like those in species of *Archaeopteris*, which have borders not very much lacerated, such as *A. (Noeggerathia) obtusa*, Lesquereux, were found by me in grey micaceous shales, underlying the Witteberg quartzites in Baviaan's Hoek, Ceres Division. In one specimen the pinnule carried minute circular rings, which I at the time thought were the remains of sporangia that had discharged their spores; the rings were arranged irregularly over the surface of the pinnule. The preservation was too poor to show any venation, and Mr. Seward, to whom the specimens were submitted, failed to see anything at all. In a letter quoted by Mr. Prosser, Sir W. Dawson says that the fruit of *A. obtusa* was to be looked for in special fertile pinnæ, and would consist of oval capsules. The South African specimens consisted of only single pinnules, and further search may reveal

[4]L. Vanuxem, Nat. Hist. of New York, 1842, Pl. III., pp. 128, 177, fig. on p. 128, also J. Hall, Contributions to Palaeontology, 16th Ann. Rept. Univ, New York, 1863; supposed to be borings of polychaete worms.

[5]L. G. de Koninck, Recherches sur les fossiles Palaeozoiques de Nouvelle-Galles du Sud., Brussels, 1876-7.

the whole fronds like the magnificent one figured by Mr. C. S. Prosser.[4] In Australia there is a very similar species *A. howitti* M'Coy[1] which Feistmantel compares with *A. hibernica* from Kilkenny and Berwickshire.[2] All these allied forms are from the Upper Devonian.

*Lepidodendron albanense*, nov. sp.

Pl. VI, Fig. 1.

The characters of this fossil agree with those of *L. nothum*, Unger[3] as far as they are shown; the two specimens which I unite under the new species have rhombic impressions, which, however, show no signs of division into leaf scar and cushion; they are contiguous, wider in a lateral than in the horizontal direction in parts of the larger specimen, but equal in diameters in the smaller specimen, and larger than broad in parts of the larger specimen. The larger specimen shows a raised reticulation of the borders of the leaf bases, with sunken areas in between. In some of the leaf-base areas there is a slight protuberance near the upper corner, which I take to be the mark left by the leaf-trace bundle. In the smaller specimen there are larger rounded protuberances fixed centrally in the scar areas, which are bordered by broad walls. The larger specimen agrees most nearly with the specimen of *L. nothum* from New South Wales, figured by Feistmantel in Plate I., fig. 4,[4] while Carruthers' fig. 8, Pl. XXVI., is very similar. Mr. Carruthers compares the Queensland specimens with *Leptophloeum rhombicum*, Dawson,[5] from the Upper Devonian of North America,[6] a comparison which our specimens appear to confirm. The decorticated stems, which I refer to the species *L. kowiense* n.sp., may probably belong to this form. The identi-

[4] Bull. U. S. Geol. Survey, No. 120, 1894 p. 49, Pl. II.
[1] Prodr. Pal. Victoria, Dec. IV., 1876, p. 21, Pl XXXVI., 1, 2, 2a.
[2] Mem. Geol. Survey N. S. Wales, Pal. No 3, 1890, p. 96.
[3] Flora d. Oberdev. Schichten Thüringens. Denkschr. d. Wien. Acad. d. Wiss., 1856, XI, p. 175, Pl. X., figs. 4-8.
[4] Mem. Geol. Survey, N. S. Wales, Pal. No. 3, 1890, p. 137.
[5] Q. J. G. S., 862, XVIII, p. 3 6, Pl. XI., fig 8, Pl. XVII, fig 53.
[6] Q. J. G. S., 1872, XXVIII. p. 350.

fication of Carruthers and Feistmantel of *L. nothum* from Australia is thought by many palaeobotanists to be erroneous,[1] and the present view held in Australia is that the form is in reality *L. australe*, M'Coy[2] from the lower Carboniferous. The unsatifactory material we have to deal with in the South African paleozoic plants renders it impossible to do more than point out the general resemblances to species from other parts of the world. It is only when reviewing the resemblances of all the forms found in the rocks that we can see our way to correlate distant strata with some degree of probability. In the particular case of *L. albanense*, the controversy that has taken place over the supposed Australian species *L. nothum* Unger, and *L. australe*, M'Coy, renders it doubtful whether we should class the South African species as Upper Devonian or Lower Carboniferous. It is certainly not an Upper Carboniferous form. The more pronounced leaf-scars on the edge of the larger specimen, by their arched upper margin, suggest that the Grahamstown specimen is perhaps a *Bergeria* form of the widely distributed Culm fossil *L. veltheimianum*, Sternb.; I have compared a specimen of this last species in the Rhodes University College collection, which comes from Niederburbach, Alsace, and is preserved in quartzite like the Witteberg specimens, and the resemblance is very strong The leaf impressions in the bark of *Lepidodendron oculus felis*, Abbado, are also rhombic, but the plan on which they are arranged is quite different; the species comes from the top-most beds of the Carboniferons in China (Chepoutse and Houyukoo)[3]. In this form the lateral points of the rhombs overlap, so that when they are pulled lengthwise by the growth of the tree they do not become in outline elongate rhombs but hexagons. The same applies to the Saharan form *L. lycopodioides*, Sternb.[4]

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[1] Kidston, Cat Pal. Plant., Brit. Museum, 1886, p. 231, also Etheridge, Records Geol Surv. N. S. Wales, Vol. II., Pt. III., 1891, p. 119.

[2] Chapman, Proc. Roy. Soc., Victoria, XVI., New Ser., Pt. II., 1904, p. 309.

[3] Zeiller, M.R. Note sur la Flore houillière de Chansi. Ann. d. Mines, 1901, p. 434, Pt. VII., figs 1—6.

[4] E. Haug, in F. Foureau, Mission Saharienne, Paris, 1905, Vol II., p. 789, Pl XII., fig. 6.

Cat. No. 150. Type. Witteberg beds. Quarry on south side of Grahamstown. No history attached.

Cat. No. 152. Witteberg beds. Howison's Poort, North of old Woolwash. Donor: Mr. James Gray.

*Lepidodendron kowiense*, nov. sp.

Pl. VI., Fig. 2.

This species is founded on certain decorticated stems in which circular or elongated protuberances stand on vertical ridges, each row of protuberances being set alternately to those on either side; the protuberances again are divided by horizontal furrows. The surface of the stem outside the furrows and ridges is flat and smooth. The protuberances have a central pit where the leaf-trace bundle came through.

Similar stems have been figured by Dawson under the name *Lepidodendron gaspianum* from the Upper Devonian (Catskill group) of North America*, and from Australia under the name *L. australe*, M'Coy, by Feistmantel[1]. M'Coy brings this latter species in very close relation to *L. tetragonum*, Geinitz from the Carboniferous of Saxony, so that the two can hardly be distinguished[2]; Kidston refers Feistmantel's Australian *L. nothum* Unger, to this species[3]. It is to this species that I would refer the specimen bearing leaves figured by Mr. Seward in the text of his description of the fossil floras of Cape Colony obtained from Atherstone quarry, Kowie (Port Alfred[4]). I have myself obtained many specimens of lepidodendroid stems from a road quarry on the west of the river, and there are a great number of specimens in the Albany Museum from a tunnel driven into the side of the hill near the railway station, Port Alfred, which was made for the purpose of following a carbonaceous shaly band between the

*Q. J. G. S., Vol. XV, 1859, p. 483, and *ib.* Vol. XVIII., 1862, p. 312, pl. XIV., figs. 26–8.

[1]Mem. Geol. Survey, N. S. Wales, Pal. No. 3, 1890, p. 136, Pl. I., fig. 5.

[2]Prodr. Pal. Victoria, 1874, Dec. 1, p. 37.

[3]Cat. Pal. Plant. Brit. Museum, 1886, p. 231.

[4]Ann. S. A. Mus., Vol. IV., Pt. I., 1903 p. 89.

quartzites to see whether there might not be a workable coal seam; but most of these specimens have the vascular scars arranged irregularly, and from this character I think I am justified in separating the stems in which the scars are arranged in strictly vertical and horizontal lines, from those which I have called *Bothrodendron irregulare*, n. sp., in which the vascular bundles are arranged irregularly.

Feistmantel[1] records *Selaginites*, *Lepidostrobus*, *Hallonia*, *Stigmaria* and *Sigillaria* from Port Alfred, and *Lepidodendron* from Grahamstown, but I have not come across specimens which could with certainty be referred to the first four genera. The specimens now described were referred to in the Museum Catalogue under the name *Ulodendron*, but how they came by this name is uncertain; it suggests that some stems bearing cones were once found along with the ordinary specimens.

Dimensions: Length 6 cm.; breadth at base 3 cm., at upper end 2.5 cm.

Cat. No. 143. Type. Witteberg beds, Cold Bokkeveld, Ceres. Donor: Mr. A. G. Bain.

Cat. No. 156. Witteberg Quartzites, Kowie, Port Alfred. Donor: Dr. W. G. Atherstone.

Cat. Nos. 157, 167, 172. Witteberg beds, black shales, Kowie East. Donor: Mr. Cock.

Cat. No. 169. Witteberg Quartzites, Driver's Kop, near Grahamstown. Donor: Mr. W. Webb.

Cat. No. 2130. Witteberg Quartzite, Grahamstown.

Cat. Nos. 2615, 2616. Witteberg Quartzites, Ladismith, C.C. Donor: Dr. Watson.

*Bothrodendron irregulare*, nov. sp.

Pl. VI., Fig. 4.

This form is a common species occurring in the quartzites and intercalated shales of the Witteberg series at Port Alfred, near Grahamstown. Mr. Seward has figured and named a specimen of

[1] Abh. d. k. böhm. Ges. d. Wiss., VII., Bd. 3, p. 25.

Lepidodendron from the Bokkeveld beds of Hex River Pass, Division of Worcester, as *Bothrodendron leslii*, under the impression that it came from the Ecca beds of Vereeniging.* He also points out the similarity of the species with the Australian *Cyclostigma australe*, Feistmantel, which again is almost identical with the *C. kiltorkense*, Haughton, from Ireland. The size and spacing of the vascular scars of the decorticated stem, and their relation in position to the stem are the same in *B. irregulare* and *C. australe* as figured by Feistmantel[1], though the Witteberg stems are often very much larger than the Australian ones.

The arrangement of the scars is roughly spiral without any strong horizontal or vertical spacing. The characters of this species are so close to *Cyclostigma australe* that I would have placed the specimens in the Albany Museum under that name had not Mr. Seward given a new name to the Ecca (Permian) form, *Bothrodendron leslii*, which is also extremely close to the Australian lower Carboniferous species. By giving the Witteberg species the name *B. irregulare* I wish to emphasize that our material is not good enough to pronounce true identity with either *C. australe* or *B. leslii*.

Mr. Rogers[2] compares the South African form with the species figured by Feistmantel from the Goonoo Goonoo beds of New South Wales, but the wider spacing of the vascular scars in the common South African *Cyclostigma* refer it rather to *C. australe* from the lower Carboniferous beds of Smith's Creek, Stroud, New South Wales, and Bobuntungen beds of Queensland, associated in both countries with *Lepidodendron veltheimianum* Sternb., a lower Carboniferous zone fossil.

Cat. No. 165. Type. Witteberg beds, graphitic slates, Estment's Farm, Kowie. Donor: Mr. J. Ayliff.

*Bothrodendron caespitosum, nov. sp.*

Pl. VI., Fig. 5.

This little form differs considerably from *B. irregulare* in

*Ann. S A. Museum, Vol IV., Pt. I., Pl. XI., fig. 4.

[1]Mem. Geol. Survey, N. S. Wales, Pal No. 3, 1890, Pl. XI., figs. 2—4.

[2]Geology of Cape Colony, 1905, p. 139.

the far closer packing of the vascular protuberances and these last in being squared by horizontal and vertical compression instead of by a diagonally spiral compression. An isolated decorticated specimen like this cannot be of much value, but Feistmantel records a form of *Cyclostigma* with vascular scars similarly closely packed from the Devonian or Carboniferous beds of Goonoo Goonoo, New South Wales, associated with *Lepidodendron nothum (australe?)*[1]. Feistmantel does not give the form a name as he thinks it may prove to be the same as *C. kiltorkense*, Haughton; at the same time he compares it with *C. minutum*, Haughton. The specimen of *C. leslii* figured by Seward[2] from Vereeniging teaches us not to pay much attention to the closeness of the packing of the vascular scars, but in *C. caespitosum* we have in addition a different mode of packing which I think is sufficiently marked to be of specific significance.

Cat. No. 142. Witteberg beds? Cold Bokkeveld, Ceres. Donor: Mr. A. G. Bain.

*Didymophyllum (Stigmaria) expansum, nov. sp.*

Pl. VI., Figs. 3, 3a, 3b, 3c.

This portion of the cast of a broad root appeared at first sight to be an ordinary lepidodendroid stem, but each vascular areole was pierced by two holes; in some the connection was broken down and on applying a plastic substance to the cast, the impressions were the same as those in the areoles of the "knorria" layer of *Cyclostigma irregulare*; in other vascular protuberances the two rootlets can be distinctly seen. I refer the present specimen to Goeppert's genus *Didymophyllum* established for a stigmaroid stem from the lower Carboniferous of Silesia. The form *D. reniforme*, Dawson[3], is very close, but this species comes from the Hamilton and Marcellus shales of New York, that is, Middle Devonian.

The specimen consists of the cast of the decorticated stem

[1] Mem Geol. Surv., N. S. Wales, 1890, Pal. No. 3, p. 142, Pl. II., fig. 7.
[2] Ann. S. A. Mus., Vol. IV., Pt. I., 1903, p. 91, Pl. XI., fig. 1.
[3] Q. J. G. S., Vol. XVIII., 1862, p. 309, Pl. XIII, fig. 15.

in very coarse reddish quartzite, and very little else than the areoles can be seen. There seem to be no specific differences between this South African form and the American *D. reniforme*, but as the latter comes from the Middle Devonian it will prevent confusion if a new name is given to the South African stem which comes from beds certainly above the middle Devonian.

Areoles rounded, with double pits, separated from each other by furrows, and arranged in linear series which are oblique to the sides of the stem, while the spiral spacing is very steep; the pits lead into small cavities, about 2 mm. long, and turned upwards, representing apparently the cast of the rootlets. Width of areole, 1.25 mm.; distance apart in linear spacing, 3 mm.; whole length of specimen, 6 cm., breadth, 2.9 cm.

Cat. No. 161. Donor: Mr. Jno. Ward. Locality, Steytlerville, on the east of the Willowmore Division, from the quartzites (Witteberg beds) of the Groot River Heights.

Reviewing the above specimens we have found resemblances in the

SILURIAN:

*Spirophyton cauda-phasiana*, M'Coy.

DEVONIAN:

*Spirophyton eifelense*, Kayser; *S. cauda-galli*, Vanuxem.

*Archaeopteris hibernica*, Haughton; *A. obtusa*, Dawson; *A. howitti*, M'Coy.

*Leptophloeum rhombicum*, Dawson; *Lepidodendron nothum*, Unger, (Carruthers and Feistmantel, not Etheridge nor Kidston.)

*Lepidodendron gaspianum*, Haughton; *C. minutum*, Haughton; *C. sp.*, Feistmantel.

*Didymophyllum reniforme*, Dawson.

LOWER CARBONIFEROUS:

*Lepidodendron tetragonum*, Geinitz; *L. australe*, M'Coy; *Cyclostigma australe*, Feistmantel.

*Didymophyllum sp.*, Goeppert.

The two best forms for comparison are *Lepidodendron albanense* and *Cyclostigma irregulare*; in regard to the first it depends whether we follow Carruthers and Feistmantel or Etheridge and Kidston, whether we make it Devonian or lower Carboniferous;

in regard to the second, the European equivalent is a Devonian fossil, the Australian equivalent is lower Carboniferous. We shall not be far wrong therefore if we place the Witteberg beds in an intermediate position at the top of the Devonian and bottom of the Carboniferous.

This result is important because in the Bokkeveld beds we find marine forms of life belonging to the lower Devonian : then, with no break in the conformability, we jump to shallow water deposits containing fossils of upper Devonian or lower Carboniferous age. The series of forms representing elsewhere the middle and upper Devonian are wanting. May this not be explained by supposing that after the lower marine Devonian sediments were laid down, the ocean floor continued to sink till it passed below the zone where sediments from land could be laid down, that is to say, into abysmal depths ? The slow accumulation of material in deep water would explain the missing out of whole geological periods and yet would be in consonance with perfect conformity. This seems to me to be a reasonable supposition and provides a case which the upholders of the theory of the permanence of ocean basins say does not exist, namely, the evidence of abysmal conditions in the rock strata.

## ZAPHRENTIS.

### *Zaphrentis zebra*, nov. sp.

Pl. VII., Fig. 12.

Corallum simple, turbinate or elongate ; septa numerous, increasing in two lateral zones so as to expand the theca like a cup. Edge of theca raised, with septa projecting inwards, alternately long and short. Wall or epitheca thin and folded, the interseptal spaces shown as ribs on the outer surface. About 60 septa in the larger specimen.

This crushed specimen shows the actual substance of the coral replaced by earthy haematite, and the interior filled up with hard red mud ; the outside is encrusted with yellow mud.

Corals have been recorded from the Bokkeveld beds, from

Oudtshoorn and Riversdale, but the specimens are too poor for description*[1]. No specimens have been recorded from the Falkland Islands, and the South American corals belong to other genera, e. g., *Stenopora*; in North America, associated with many fossils identical with our Bokkeveld ones, there have been described a large number of forms, such as *Zaphrentis simplex*, *Z. gigantea*, *Z. ungula*. *Z. dalei and Z. stokesi*. Until comparison with the American forms is possible it is best to keep the South African species separate.

In the Carboniferous rocks in North Africa there are also a number of *Zaphrentis*. From Tidikelt in Algeria, for instance, among other forms, there occur *Spirifer*, *Leptaena*, *Pleurotomaria*, *Orthoceras*, *Zaphrentis* and *Fenestella*[2]. The grouping of genera reminds one of that in the Bokkeveld beds, and the occurrence of *Fenestella* with *Zaphrentis* suggests the same conditions of deposition.

Dimensions:—Length, 3.8 cm. Breadth at widest part, 3.6 cm.

Cat. No. 1586, type; 1587. Donor: Miss Hockey. Locality, Cockscomb Mountains.

## CONULARIA.

This genus was represented in the specimens from the Cederbergen, collected by Dr. Smith and submitted by Sir John Herschel to Sir Roderick Murchison[3]. The last mentioned identified the species with *C. quadrisulcata* from the coal measures of Coalbrook Dale[4], and Sharpe likewise compared some of the specimens in the Bain collection with this same species, but the state of preservation was too bad to admit of a proper identification. Sharpe's *C.*

*[1]Ann. Rept. Geol. Comm., 1898, Cape Town, 1900, p. 60, ib. 1899, Cape Town, 1900, p. 56.

[2]G. Flamand, Compt. rend. CXXXIV., 1902, p. 1533.

[3]Sil. Syst. 1839, p. 650.

[4]Trans. Geol. Soc., 2nd Ser, Vol. V., Pl. 40, fig. 2.

*africana* was later found by Ulrich in the Icla shales of Bolivia[1], and Reed finds three more of the American species—*C. quichua* St. and Dod., *C. c.f. undulata*, Conrad and *C. c.f. acuta*, Roemer—in the South African beds.

*Conularia africana*, Sharpe[3].

Pl. VII., Figs. 13, 14, 15.

These very extraordinary forms of life are represented in the Albany Museum collection by two specimens showing the margins. In both cases the lateral plates are continued upwards and are drawn in at the corners, producing scoop-shaped ends with rounded ornamental striations, which bend upwards and close the greater part of the orifice. This seems to point to the fact that the growing edge was thin and flexible, the shell being harder and thicker in the main body. There seems, however, to have been a certain amount of play between the two sides of each lateral plate and at the corners where the two adjacent plates meet. The blue-black matrix in which the largest specimen is preserved, suggests that it is phosphatic, as in so many cases where thin shelled *Conularias* occur. The nature of the shell, consisting of four pairs of separate plates, reminds one of the barnacle shell, with its four to ten pairs of lateralia, more or less completely fused at their sides. In no mollusc is the shell separated into parts tangentially, though in the Chitons and the Cephalopods it is divided longitudinally. Suggestions have been made by various authors as to the affinities of this group; Neumayr compared them with the Capulidæ[4], and Ihering[5] regarded them as ancestral Cephalopods, but the balance of modern views tends to regard them as an aberrant branch of the Gastropods. This classification, however, breaks into the definition of the class Gastropoda, which are molluscs with an undivided mantle, secreting a simple shell, and

[1]Neues Jahrbuch, 1893, Beil. Bd. VIII., p. 29, Pl. III., fig. 4.

[2]Ann. S. A. Museum, 1904, Vol. IV., Pt. VI., pp. 247-249.

[3]Sharpe, Trans. Geol., Ser. 2, Vol. V11., p. 214, Pl. XXVII., fig. 13.

[4]Abh. k. k. geol. Reichanstalt, Bd. VII., 1879, heft 5, p. 18.

[5]Die Aptychen. Neues Jahrbuch, 1881, I., p. 88.

Pelsener[1] has strongly objected to the inclusion of the Conularidæ among the Pteropoda; the association of *Conularias* with littoral forms like Trilobites and Spirifers of the Bokkeveld is contrary to what one would expect in beds containing Pteropods. The suggestion that the *Conularias* were worms was not supported by Nicholson's investigation into the minute structure of the shell.

The ornamentation consists of very fine striations in the younger forms, and then suddenly becomes developed on a larger scale; three periods sometimes can thus be distinguished in one example. The very large ornamentation occurs on some impressions of the outer shells, which are labelled *C. pinchiniana*, Salter, in manuscript, but I see no justification for separating this larger form from the smaller ones; the little pustules on the ribs are hardly of specific significance.

It is interesting to find the same species among so many other South African forms in Bolivia[2].

Cat. Nos. 97, 101, 116, 117. Donor: Mr. A. G. Bain. Locality, Cederbergen.

Cat. Nos. 1478, 1481, 1483. Donor: Mr. A. G. Bain.

Cat. Nos. 88, 1479 (*Conularia pinchiniana*, Salter). Donor: Mr. A. G. Bain.

*Conularia c. f. acuta*, Roemer. Cat. No. 2607. Donor: Geological Commission. Locality, Gamka Poort.

## CENTRONELLIDÆ, Hall & Clarke.

### *Rensselaeria*, Hall.

Mr. Reed, in his description of the Geological Commission's specimens from the Bokkeveld beds, describes two species of Rensselaeria, which he names *R. sp. a.* and *R. sp. b.* In the Albany Museum there are three specimens which I think must be referable to this genus, one, perhaps, is the same as *R. sp. a.* which has been preserved under different conditions, the second is certainly *R. sp. b.*, and the third, though quite different from either of the others, may be a young form of *R. sp. a.*

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[1] Bull. Soc. Belge de Geol., Vol. III., 1889, p 124.

[2] Ulrich, Neues Jahrbuch, Beil. Bd. VIII., p. 29, pl. III., fig. 4.

*Rensselaeria relicta*, nov. sp.

Pl. VII., Fig. 7.

The specimen consists of the internal cast of the brachial valve, showing the ribs rounded and strongly marked, intercepted by rings of growth, but fading out towards the hinge. The very deep adductor scars show that the shell must have been very thick in this region, and thus explaining the obliteration of the ribs on the inside of the valve. The number of the ribs is uncertain, but sixteen can be counted on the left half, thus making the outer shell to have had from 36 to 40. There are distinct impressions of the proximal part of the arms, commencing with a little knob below and within the teeth sockets; thence there are radially divergent ridges to near the middle of the adductor impressions, and about a third of the depth of the valve from the umbo to the margin; here there is again a little knob showing the point where the arms curved forwards to form the loop. The adductor scars are d vided by a strong median septum; the diductor impression on the hinge plate is also prominent. Hinge plate bilobed with strong dental sockets at the outer corners for the reception of the pedicle valve teeth. Shape of the valve almost circular, but the margin in the middle has been crushed inwards giving the shell a rhynchonellid form.

Dimensions: Width, 3.4 cm.; depth 2.8 cm.

Although the hinge plate and the shape of the shell differ considerably from Reed's *R. sp. a.*, the general characters are sufficient to suggest that the two forms may be the same under different conditions of preservation.

Cat. No. 93. Donor: Mr. A. G. Bain. Locality, Warm Bokkeveld.

The specimen must have been in Mr. Bain's collection when he sent the fossils to England which are described by Messrs. Sharpe and Salter in the Transactions of the Geological Society, 2nd series, Vol. VII, 1856.

*Rensselaeria hottentot*, nov. sp.

Pl. VII., Fig. 8.

This little shell I had taken for a *Retzia* when sorting out the specimens in the Geological Commission, but on closely examining it I have come to the conclusion that it is probably a *Rensselaeria*; there is no internal structure to guide one in the matter. It is certainly an undescribed species. The specimen is an external cast of the brachial valve.

The central fold is strongly marked with a slight but distinct furrow in the centre ; there are seven ribs on either side, making 15 in all. Near the middle the ribs are very prominent, with deep furrows between, marked with striæ of growth : towards the alæ they become smaller but still sharply defined. Besides the striæ there are rings of growth. The pedicle impression of the ventral valve, with a slight marginal hinge area, just appears over the dorsal valve.

Dimensions :—Width 0.7 cm. Depth 0.8 cm.

Cat. No. 2578. Donor : Geological Commission. Locality, Hottentot's Kloof, Ceres.

*Rensselaeria*, sp. b., Reed.

Reed, A.R.C., Ann. S.A. Museum, Vol. IV., p. 177, Pl. XXI. fig. 9.

This well marked species is represented in the Albany Museum by a complete internal cast of the brachial valve. It is unfortunate that it has not a name ; it is said to be similar to *R. cumberlandiæ*, Hall, from the Oriskany Sandstone.

Cat. No. 2602, Donor : Geological Commission. Locality, Boschluis Kloof, Ladismith, C.C.

The following specimens are pedicle valves, or impressions of the pedicle valve, with no distinctive characters, and may be any of the radially striate brachiopods.

Cat. No. 1498. Donor : Mr. A. G. Bain ; no locality.

Cat. No. 2590.—*Trigeria* (?). Donor : Geological Commission, Gydow Pass.

Cat. 2603. Donor : Geological Commission. Locality, Koudeveld Berg.

## TRIGERIA, Bayle.

*Trigeria simplex*, nov. sp.

Pl. VII., Fig. 9.

The specimen I make the type of this species was compared with Mr. Reed's *Trigeria gaudryi*, Oehlert, but though the general similarity of the cast is very marked, there are differences which are specific. The specimen now to be described is the cast of the brachial valve, and shows the median rib wider but not otherwise distinguished from the lateral ribs. The first three lateral ribs converge towards the prominent adductor scars. The ribs are low, separated by furrows of about the same width and depth and interrupted by two rings of growth. I can only count 17 ribs in all, making the shell to have originally had about 21. Had there not been such a strong resemblance to the shells which Mr. Reed had named *Trigeria gaudryi*, I should have compared this present form with *Retzia jamesiana* Hartt[1], *Centronella jamesiana* of Katzer.

In a large slab of grey sandstone from Montagu there are a number of shells, both brachial and pedicle valves, which, however, are too poorly preserved to show the margins; the median fold in the brachial valve tapers rapidly towards the umbo and has a slight furrow down the centre, and the median furrow on the pedicle valve is similar, with a central fold. The best preserved specimens show 15 ribs, but a few more may have existed in the original shell; there is another variety on the same slab with still fewer and more strongly marked ribs. I believe these forms must be the same as the *Trigeria simplex* from the Gydow Pass.

Dimensions: Length, 0.75 cm. Breadth uncertain.

Cat. No. 2589. Type. Donor: Geological Commission. Locality, Gydow Pass.

Cat. No. 79. Donor: Dr. W. G. Atherstone. Locality, Montagu.

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[1]On the Devonian Brachiopoda of Ereré, Brazil, Bull. Buffalo Acad. Nat. Sci., 1874, p. 243.

*Trigeria silveti*, Ulrich.

Pl. VII., Figs. 10a, 10b, 10c.

*Centronella silveti*, Ulrich.

Ulrich, A., Neues Jahrbuch, Beil. Bd. VIII., 1893, p. 51, pl. IV., fig. 15.

*Rhynchospira silveti*, Ulrich.

Reed, A.R.C., Ann. S.A. Museum, IV., p. 188, pl. XXIII., figs. 8 and 9.

The nearest form seems to be the *Retzia wardiana*, Hartt, from Brazil, which Katzer[1] refers to the genus, *Centronella*. Reed, *loc. cit.*, recognises its centronellid characters, but places it among the Athyridæ under the genus *Rhynchospira*. It seems best to confine the genus, *Centronella* Billings, to the smooth forms, mostly North American, and to unite the plicated forms, *C. simplex* n.s., *C. silveti*, Ulrich, *C. margarida*, Derby, *C. bergeroni*, Oehlert, and *C. gaudryi*, Oehlert, from South America, South Africa and France, under the genus *Trigeria*.

Cat. No. 2127. Donor: Dr. W. G. Atherstone. Locality, Montagu. Occurs with *Cryptonella baini*, *Chonetes*, crinoid stems, and some remarkably developed *Leptocœlia flabellites* which suggest that it may have been forms like these which Sandberger[2] thought were *Tropidoleptus carinatus*, Conrad.

## SPIRIFERIDÆ.

The first specimens of Spirifers from the Cape were brought to Europe by Dr. Krauss and referred to by D'Archiac and de Verneuil[3] in their memoir on the fossils in the Rhenish Provinces under the names *Sp. macropterus*, Goldfuss, and *Sp. speciosus*, Schlotheim. Leopold von Buch[4] later described a form as *Sp. capensis* from the Cogman's Kloof, also brought to Europe by Dr. Krauss, and remarks that it belongs to the group of *Sp. speciosus*.

[1] Grundzüge d. Geol. d. unt. Amazonasgebietes, Leipzig, 1903, p. 196.

[2] Neues Jahrbuch, 1852, p. 581.

[3] Trans. Geol. Soc., London, 1842, (2), VI., p. 303.

[4] Mem. Acad Sci., Berlin, 1846; Quart. Journ. Geol. Soc., III., 1847, Pt. II, p. 57.

Dr. Krauss reported on his fossils to the Naturalist's Association at Mayence in 1842[1], but he was chiefly interested in the Cretaceous fossils from Algoa Bay, and when Dr. Sandberger in 1846 appealed to him for information as to the localities of his palæozoic specimens, he was unable to give anything definite[2]. Dr. Sandberger decribed Dr. Krauss's *Spirifer* as *Sp. macropterus*, Goldfuss, *var. mucronatus*, Sandberger, and this species I believe to have been the *Sp. antarcticus* of Morris and Sharpe. It is fortunate that neither these earlier species can stand, as Morris and Sharpe had already described in 1846 some *Spirifers* from the Falkland Islands under the names *Sp. hawkinsi*, *Sp. orbignyi*, and *Sp. antarcticus*. In the Eastern Province Journal for 1856, Mr. A. G. Bain reproduces a letter of T. Rupert Jones, dated November 24th, 1852, in which the latter identifies the Cape Devonian fossils as of the Falkland Islands type[3]. Mr. Sharpe later described the *Spirifers* from the Warm Bokkeveld, collected by Mr. A. Bain, but owing to the confusing nature of the material, it it impossible to determine which he meant as *Sp. orbignyi* and which as *Sp. antarcticus*. Mr. Reed has lately reexamined Sharpe's types and comes to the conclusion that there is only one species represented, namely *Sp. orbignyi*. I believe, however, that Morris and Sharpe's original species are good, and are represented in our South African specimens. The short, gibbose ones, with backwardly directed beak, I propose to call *Sp. orbignyi*, while the fusiform ones with upright beak, which have been sometimes divided into two species, and which have been called *Sp. mucronatus* by Sandberger, *Sp. capensis* by Von Buch, *Sp. macropterus* and *Sp. speciosus* by D'Archiac and de Verneuil, *Sp. orbignyi* and *Sp. antarcticus* by Sharpe, *Sp. orbignyi* and *Sp. cf. pedroanus* by Reed, I propose to call *Sp. antarcticus*. Mr. Reed's *Spirifer ceres* consists of two species ; his figure Pl. XXII, fig. 7 is very close to *Sp. hawkinsi* of Morris and Sharpe, while his fig. 6, with nine distinct ribs on each side of the median fold is an overgrown example

[1] Ber. Vers. ges. D. naturf., XX., Mainz. 1842.

[2] Quart. Journ. Geol. Soc., London, Vol. IX., 1846, Pt. 2, p. 2.

[3] See Trans. Geol. Soc.. S.A., Vol. II., p. 74. Johannesburg, 1897.

of either *Sp. orbignyi* or *Sp. antarcticus*. Mr. A. G. Bain when he read his paper to the Geological Society in 1852, only submitted a selection of his fossils which were described by Messrs. Sharpe and Salter. From an examination of the remainder in the Albany Museum, and of the fossils collected by Dr. Atherstone, I have come to the conclusion that apart from the vagaries of apparent structure produced by distortion, the shells of the Spirifers were very susceptible to the nature of the sea bottom on which they grew. The natural floor was that on which the calcareous sandstone was deposited, which now forms the fossiliferous sandstone; in an area in which mud was being laid down, the shells grew to a far larger size, but were thin and irregular, and the specimens I obtained from the Slangfontein road quarry, which have been called *Spirifer ceres* by Reed, are examples of shells in this condition. Between the two extremes we find every gradation, and the thicker the shells the wider the hinge area, and the thinner they are the narrower this becomes; I cannot, therefore, see any specific significance in the depth of the hinge area, which, moreover, is very seldom seen, as the specimens are usually internal casts. In the exact number of ribs, angulation of the sinus, median fold and ribs, also, I see no specific characters; for instance, in the two figures of Mr. Reed's *Spirifer ceres*, one has rounded, the other distinctly angular ribs, whereas in his *Spirifer pedroanus* his only difference between this form and the *Spirifer antarcticus* of Morris and Sharpe, besides the width of the hinge area, is the more rounded form of the ribs. The whole difficulty of this troublesome business is the unsatisfactory nature of the fossils, and the fact that both Sharpe and Reed had only selections from larger collections to work from. I have a strong suspicion that had we a larger number of actual shells instead of merely casts, a half a dozen varieties could be separated out. Taken as a whole, the Bokkeveld Spirifers have affinities with North and South American forms. The Australian species referred by Etheridge[1] to the forms *Sp. bisulcata*, Sow, and *Sp. undifera var. undulata*, F. Roemer, have some resemblances respectively to *Sp. antarcticus*

[1] Q.J.G.S., Vol. XXVIII., p. 329-330, Pl XVI., figs. 1, 3-5.

and *Sp. orbignyi*, and one may also perhaps compare the Chinese form *Sp. cheehiel*, de Koninck[2], from Yunan, with them The other fossil species associated with the Australian Spirifers do not bear out the resemblances, but it is very desirable that a careful comparison of the South African species with the Australian ones should be made, as several Australian friends have remarked on the similarity.

*Spirifer orbignyi*, Morris and Sharpe.

Pl. VII., Figs. 3, 4, 5.

1846. *Spirifer orbignyi*, Morris and Sharpe. Q. J. G. S., II, p. 276, pl. XI., fig. 3.

I find in the Albany Museum collection a form which is identical with the *Sp. orbignyi* of Morris and Sharpe, which Charles Darwin brought back from the Falkland Islands. It is gibbose, with the beak in the pedicle valve projecting away from the shell in the cast, as opposed to the other form, which is fusiform, with the cast of the beak in the same plane as the shell. Morris and Sharpe define the species as having a narrow hinge area, but the cast of this species which they figure (3a pl. xi) belongs to a shell with a very deep hinge area. Owing to the nature of the material there will always be great confusion between *Sp. orbignyi* and *Sp. antarcticus*. The best specimens in the Albany Museum occur on a slab with *Leptocoelia flabellites* and *Chonetes coronatus*. In the cast of the pedicle valve there are eight ribs on either side of the sinus; they are very little more prominent than the furrows between, and are obliterated towards the hinge. The sinus is deep and confined, with a somewhat flattened base; it is wide at the margin, but converges rapidly towards the beak, and in the cast of the beak it runs upwards between the diductor scars with parallel sides. The cast of the beak rises distinctly away from the plane of the surface of the shell as in *Spirifer duodenarius*, Hall, and *Sp. sp.*, of Ulrich. The impression of the hinge area shows a few broad lines and not the close horizontal striations of *Sp. antarcticus*; it gives one the impression of being curved like in the *Sp. capensis* of Von Buch, but sufficient is not preserved to settle

[2] Q J.G.S., Vol. IX., pl. XV., fig. 17.

this point, but it is certainly inclined towards the beak of the pedicle valve and not vertical The surface of the internal cast is smooth, but on either side of the beak there are close-set striations where the diductor muscles were attached. The beak and shoulders of a very large specimen of this species on the same slab shows these striations on the beak very well, but there are no ovarian pittings on the shoulders. The ribbed portion of this specimen has been broken away, yet the appearance of the cast differs in no way from the cast of *Sp. orbignyi* adjacent except in size. Reed's *Spirifer (Reticularia?) sp. b.** is the same as this broken cast, and I believe that his specimen is a worn portion of a large *Sp. orbignyi.* In yet another fragment showing only the beak, the end of the cast of this is preserved, showing the cleft at the extremity, and while the striations of the diductor muscle scars are clear and distinct, I can see no sign of the adductor scars; the ribs of the shell have also left an impression in the cast of the beak.

Affinities :—*Spirifer duodenarius*, Hall, Oriskany Sandstone, seems to my mind to stand nearest to this species.

Cat. No. 2128. Donor : Dr. W. G. Atherstone, marked Montagu, 1889.

Cat. No. 2601. Donor : Geological Commission. Locality, north of Uitkomst homestead, Ceres. Many specimens of *Sp. antarcticus* with it.

Cat. No. 80. Donor : Mr. A. G. Bain. Locality, Warm Bokkeveld. A few of the casts have the beak strongly bent back and the mesial furrow in the dorsal valve constricted towards the centre ; these features, besides the more semicircular form, enable one to pick out the *Sp. orbignyi* from the multitude of specimens of *Sp. antarcticus.*

*Spirifer antarcticus*, Morris and Sharpe.

Pl. VII., Figs. 1, 2.

1842 { *Spirifer macropterus*, Goldfuss.
*Spirifer speciosus*, Schlotheim.

D'Archiac and de Verneuil, Trans. Geol. Soc. London (2) VI., p. 381.

*Ann. S.A. Mus. IV., p. 185, Pl. XXIII., fig. 4.

1846. *Spirifer antarcticus*, Morris and Sharpe.
Quart. Journ. Geol. Soc., London, II., p. 276, Pl. XI., fig. 2.

1846. *Spirifer capensis*, von Buch, Bären Insel, Mem. Acad. Sci., Berlin, p. 12, fig. 1. Quart. Journ. Geol. Soc., London, 1847, III., Pt. II., p. 57.

1847. *?Spirifer boliviensis*, D'Orb.
Voyage dans l'Amerique meridionale, III., Pal. p. 37, VIII., tab. 2, figs. 8 and 9.

1856. *Spirifer macropterus, var. mucronatus*, Sandberger.
G. and F. von Sandberger, Verstein. rhein. Schichtsyst. in Nassau, Wiesbaden.

1856 { *Spirifer antarcticus*, Morris and Sharpe.
*Spirifer orbignyi*, Morris and Sharpe.
Sharpe, Trans. Geol. Soc. (2), VII., pl. 206-7, Pl. XXVI., figs. 1-5.

1903 { *Spirifer cf. pedroanus*, Hartt.
*Spirifer orbignyi*, Morris and Sharpe.
*Spirifer sp. a.*
Reed, Ann. S. A. Museum, Vol. IV., Pt. III., p. 180, Pl. XXII., figs. 4 and 5; Pl. XXIII, figs. 2 and 3.

Both Kayser[1] and Reed[2] consider Sharpe's *Spirifer orbignyi* and *Sp. antarcticus* as identical, with which I agree. Reed states that provided *Sp. orbignyi* is really specifically different from *Sp. antarcticus*, then the Cape specimens are all *Sp. orbignyi* and not *Sp. antarcticus*, because the number of ribs in the latter species is too great, the ribs are angulate instead of being rounded and the sinus on the pedicle valve is angulated. Morris and Sharpe's definition of the species, however, agrees closely with the Cape specimens, and the number of ribs on the shell cannot be guaged by the number of ribs on the cast, for most of the smaller ones in the alae do not show through the substance of the shell. As a rule the number of ribs varies from 20 to 24. I reserve the name *Sp. antarcticus* for the Spirifers which have a transversely fusiform shape in which the ribs are broad, with moderately deep

[1] Zeitschr. deut. Geol. Gesellsch., XLIX., 1897, p. 297, pl. IX., figs. 1-4.
[2] Reed, op. cit., p. 181.

furrows between, the mesial furrow with a slight fold down the centre, and continued uninterruptedly up into the cast of the beak. Hinge area straight or curved forwards, with numerous fine longitudinal striae and the cast of the beak rising to it in the same plane as the surface of the cast of the shell. Furrows sometimes show on the sides of the cast of the beak, at other times this latter is quite smooth, the difference being due either to the original thickness of the shell, or to its having been subjected to solution before being imbedded. In the dorsal valve the median fold has the same furrow as in *Sp. orbignyi* ; the sinus in the ventral valve has a slight median fold. The shells are usually distorted, rendering one end of the alae very pointed, while the other is markedly rounded. The hinge area is usually vertical, but one very rarely finds the actual shell undisturbed. In Sharpe's figures one is looking at the impression of the hinge area surface ; in the specimen I figure the beak in the pedicle (Sharpe says dorsal) valve is very strongly curved over, and the hinge area likewise curved, as in von Buch's figure of *Sp. capensis*. It is this fact that makes me think that von Buch's species was founded on specimens of *Sp. antarcticus* and not of *Sp. orbignyi*, though the other features seem to agree more nearly with the latter form. The different ways in which the shells have been preserved, sometimes imbedded with the two valves adherent when the internal cast is complete, at others with the internal casts of the dorsal and ventral valves separately fossilized, make it extremely difficult to fix on specific characters, and I think it the safest to have only one species for the commoner forms.

Ulrich's *Sprifer chuquisaca* seems closely allied to *Sp. antarcticus*, but I do not think with Kayser and Reed that the resemblances are sufficient to identify the Cape specimens with those from Bolivia. *Sp. buarquianus*, Katzer, is quite distinct from *Sp. antarcticus*, while *Sp. coelhanus*, Katzer, stands very near. Reed separates the very broad ribbed form which Sharpe figures (Pl. XXVI, fig. 6.) as *Sp. vogeli*, v. Ammon, and as it is closely allied to *Sp. antarcticus*, and this latter possesses the surface ornamentation which von Ammon figures, the species will stand ; I have never seen the form. With regard to the form which Reed refers

to as being near to *Sp. pedroanus*, Hartt, I do not think that the South African are so closely similar to this American form as to warrant the application of the name. Rathbun[*1] describes the species as having 10-16 plications *on each side of the fold or sinus*: the words in italics are left out by Reed[*2] so that he takes the species to have from 10-16 ribs in all, instead of 20-32 ribs on each valve. Kayser[3] has, since Reed's paper appeared, figured a further series of *Spirifer pedroanus*,[4] and they are all too closely ruled with narrow ribs to be like the South African forms, while the slight sigmoid trace of the margin differentiates it strongly from the *Sp. antarcticus.*

The *Spirifer sp. a.* of Reed is a natural replacement of the shell by calcite and is a form of fossilization which is very rarely seen. The examples in the Bain collection in the Albany Museum, which are probably duplicates of the slabs examined by Reed in the British Museum, show the impression of the outer surface of the shell together with the internal casts, and both belong to one and the same species, *Sp. antarcticus.* A few examples with the beak bent back and the mesial fold constricted in the centre and generally of a more rounded form I put down to *Sp. orbignyi.*

Mr Reed's figures, *op. cit.*, Pl. XXII., figs. 4 and 5, and Pl. XXIII., figs. 2 and 3, may be taken as typical.

Affinities :—*Sp. coelhanus*, Katzer, from Brazil, and *Sp. chuquisaca*, Ulrich, from Bolivia.

Cat. No. 51. Matrix, light grey shale easily cut with a knife. Shell normal, but with very low beak ; sinus with slight median fold. Donor : Mr. A. G. Bain. Locality, Warm Bokkeveld.

Cat. No. 55, 56, 57 and 58. Internal casts of very deep shells which must have had an enormours thickness of shell substance about the beak. Donor : Unknown. Locality, Warm. Bokkeveld.

Cat. No. 80. A large slab of Fossiliferous Sandstone crowded with casts and impressions of *Spirifer antarcticus* ; some of the

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[*1] Bull. Buffalo Soc. Nat. Sci., I., 1874, p. 238.

[*2] Op. cit., p 183.

[3] Neues Jahrbuch ; Beil. Bd., 1893, VIII , p. 65, p IV., figs. 19-20.

[4] Grundzüge d. Geol. d. unteren Amazonasgebietes, Leipzig, 1903.

shell substance still adherent. At the back of the slab there is one impression with semi-circular margin and rings of growth, which may be put down to *Sp. orbignyi*. Donor: Mr. A. G. Bain. Locality, Warm Bokkeveld.

Cat. No. 2601. Block of yellowish grey calcareous sandstone with casts of *Sp. antarcticus* along with *Sp. orbignyi*, the two species very strongly separated by the straight and backwardly projecting beaks in the respective casts.

Cat. No. 133 and 134. Calcareous standsone matrix (Fossiliferous sandstone) with blue shale sometimes micaceous, with *Spirifer antarcticus* in all states of preservation. A loose internal cast shows the pedicle and dorsal valves, and an impression of the outer surface of the pedicle valve with the *Sp. vogeli* radial striations; another shell shows the external aspect of the dorsal valve. The forms are wide, with a slight rounding of the extremities of the alæ; hinge area closely striated; lines of growth strongly marked towards the margin. The shell substance is partly present or at least, the replacement in calcite, and shows the massiveness of the shell about the beak; in one, the internal septum dividing the beak at the point is shown. *Chonetes* and *Leptocoelia* occur on the slab. Donor: Mrs. Martin. Locality, Montagu.

Cat. No. 2600. Donor: Geological Commission. Locality; Witzenberg Valley. Marked by Mr. Reed *Sp. cf. pedroanus*; it agrees with the specimen I figure as *Sp. antarcticus*.

## *Spirifer ceres*, Reed.

Pl. VII., Fig. 6.

1903, *Spirifer ceres*, Reed.

Ann. S.A. Mus. Vol. IV., p. 184, pl. XXII., fig. 7; pl. XXIII., fig. 1.

These forms have the appearance of being varieties of *Sp. orbignyi* and of *Sp. antarcticus*. They are usually associated with overgrown specimens of the shells with a greater number of ribs, and are found in a clayey matrix. Mr. Reed separates *Sp. ceres* from *Sp. hawkinsi*, Morris and Sharpe, owing to the latter

being more mucronate and transverse. Exactly the same variation can be seen in specimens of *Sp. antarcticus* where the impression of the external shell may show well-rounded alæ, and the internal cast of the same shell show sharp points owing to the matrix not having penetrated to the margin. Morris and Sharpe state that the hinge area in *Sp. hawkinsi* extends the whole width of the shell, but their figure of the brachial valve shows the outer halves of the hinge line to be bent downwards, so that the hinge line would be abbreviated. The high angle of the apex of the hinge area in Reed's fig. 1, Pl. XXIII. and of the specimens in the Albany Museum suggest the same thing. The internal cast of the beak is in the same plane as that of the cast of the shell surface, as in *Sp. antarcticus*, but in *Sp. hawkinsi* it rises away from the plane as in *Sp. orbignyi*. I feel very doubtful whether Morris and Sharpe's type has not been badly figured and described, and that the specimens which we must call *Sp. ceres* are not really referable to *Sp. hawkinsi*. The species seems very close to *Sp. speciosus*, and von Buch mentions one form from the Spiti shales in Thibet which also seems to have some resemblances; this form is figured but not named* and von Buch mentions that the striæ of growth project like scales.

I cannot agree with Mr. Reed that *Sp. lauro-sodreanus* of Katzer is identical with *Sp. ceres*[1]; if the latter species is to be superseded it should be in favour of *Sp. hawkinsi*.

Cat. No. 2507 and 2599. Donor: Geological Commission. Locality, Slang Fontein Road Quarry, Warm Bokkeveld. Ventral valves.

Cat. No. 49. Donor: Mr. A. G. Bain. Locality, Warm Bokkeveld. Dorsal valve.

## PALAEONEILO, Hall.

This genus is represented by the following species in the

*Royle, J. F. Illustrations of Botany and other branches of Natural History of the Himalayan Mountains, 2 vols. Folio, 1839, 100 coloured plates.

[1] Reed, Ann. S.A. Museum, Vol. IV., p. 194.

Bokkeveld beds :—

*Palaeomeilo antiqua*, Sharpe.
*P. rudis*, Sharpe.
*P. sub-antiqua*, Reed.
*P. aff. constricta*, Conrad (Reed).
*P. cf. fecunda*, Hall (Reed).
*P. sp.* (Reed).
*P. boyesi*, n. sp.
*P. arcuata*, n. sp.

*Palaeomeilo boyesi*, nov. sp.

Pl. VIII., Fig. 4.

Three specimens of a form allied to *P. rudis*, Sharpe, but with a more prominent umbo and longer anterior portion are included in this species.

Shell elongate elliptical, produced anteriorly, not quite twice as long as high. Basal margin almost straight; anterior end rounded and somewhat narrowed; posterior end as in *P. rudis*, Sharpe, broader, but with weak sinus in the inferior margin. Cardinal line about three-fourths the length of the shell. Valves somewhat strongly convex, flattened in the middle portion with a ridge running from umbo to posterior margin and then a weak sulcus from the umbo to the marginal sinus. Surface ornamentation consists of fine concentric striae, very sharp and distinct in the region posterior to the oblique ridge; also several strong concentric furrows. Umbo prominent, situated a little anteriorly to the middle line. The shell has somewhat the shape of the form which Reed likened to *P. fecunda*, Hall,[1] but the umbo is more centrally placed, the anterior margin is more produced, and the shell generally is more convex.

Dimensions :—Length, 5.25 cm.; height, 3.2 cm.

Cat. Nos. 86, 87, Type. Donor: Mr. A. G. Bain. Locality: Hottentot's Kloof. Matrix, dark grey shale.

Cat. No. 2570. Donor: Geological Commission. Locality: Uitkomst. Matrix, dark grey shale.

[1] Ann. S. A. Museum, Vol. IV., p. 264, Pl. XXXII., fig. 6.

I dedicate this species to Mr. C. V. Boyes, the Civil Commissioner of Ceres at the time of my visit there, and the officer who sent the first diamond found in South Africa to Dr. Atherstone to be tested.

*Palæoneilo arcuata*, nov. sp.

Pl. VIII., Fig. 5.

Shell transversely elongate, almond shaped, twice as long as high. Dorsal margin inclined at an angle of 140° on either side of the umbo. Anterior margin rounded, meeting the hinge line at an obtuse point, and curved under to meet the ventral margin. Ventral margin widely and evenly arcuate with a slight indentation behind. Posterior margin curving up to the hinge line and ending in a rounded point. Beaks situated at a distance from the point equal to two-thirds the height of the shell: quite prominent and incurved to the hinge line. Valves most convex along the middle line, narrowing at the basal edge, as shown in the cast: arching strong and regular, but decreasing in strength towards the hinder portion. Oblique ridge running from umbo to posterior margin, with a weak sulcus behind. Some trace of small transverse teeth in the hinge line, which is slightly curved. Ornamentation not apparent as the specimen is a cast, but there were evidently concentric rings of growth.

Dimensions: Length, 4.4 cm. Height, 2.4 cm.

The shell has a strong *Leda* form, and perhaps may eventually be referred to this genus along with *Leda inornata*, Sharpe, but the oblique ridge seems to connect it with the forms of *Palæoneilo* with which it is associated, especially *P. fecunda*. Hall.

Cat. No. 103. Donor: Mr. A. G. Bain. Locality, Hottentot's Kloof, Ceres.

NUCULITES, Conrad.

*Nuculites lunulata*, nov. sp.

Pl. VIII., Figs. 6, 6a.

Shell transversely elongate, not quite twice as long as high. Posterior end slightly broader than the anterior, evenly rounded

Anterior end imperfect. Cardinal margin oblique to long axis of shell and directed away from the umbos at an angle of 140°; hinder portion of the post-umbonal hinge-line bent slightly downwards. Inferior margin somewhat curved and directed forwards and upwards. Valves gently and evenly convex; greatest width behind the umbos and near the upper margin. Ornamentation consisting of broad concentric rings with finer ridges between; on one side of the cast the gathering together of the concentric rings at the anterior end is far greater than on the other side, a fact which leads me to think that the *Modiomorpha* form of the shell is produced by distortion. Hinge line edentulous as far as seen, but the matrix standing up between the hinge facets, these being now removed, is broken away in the place where *N. capensis*, Reed, is shown to have a toothed portion of the hinge. Area as in *Modiolopsis (Modiomorpha) baini*, Sharpe, elongately lunulate. Beaks strongly incurved towards the hinge, sharply pointed. Clavicular buttress small, vertical, concave forwards.

The position of this internal cast is doubtful. Had it been an external cast it would have been probably referred to the genus *Modiomorpha*, as it would have been also from the edentulous nature of the hinge: the clavicular buttress, however, associates it with forms of *Nuculites*, such as *N. abbreviatus*, Sharpe. The shells of this genus are very variable owing to distortion, one cast in the Albany Museum showing a form referable to *N. abbreviatus*, and the other side to *N. branneri*, Clarke. The very imperfect shell figured by Reed as *Sanguinolites sp.*[1] has much the appearance of this species.

Dimensions: Height, 3.3 cm. Length, 6 cm.

Cat. No. 135. Donor: Mr. A. G. Bain, Bokkeveld beds, Leo Hoek. This locality, so often given in Bain's paper in the transactions of the Geological Society, is probably the farm Leeuwen Fontein lying under Hottentot's Kloof, to the west, and adjoining Laaken Vley; the farm lands lie in a hollow between a plunging anticline of Table Mountain Sandstone and the Bokkeveld beds, which rise in terraced escarpments, opposite.

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[1] Ann. S.A. Mus., Vol. IV., 1904, p. 252, Pl. XXXI., fig. 4.

## CYPRICARDELLA, Hall.

*Cypricardella pohli*, Clarke.

Pl. VIII., Fig. 3.

This form has some resemblance to the *Leptodomus? ovatus*, Sharpe, but from what little can be seen of the hinge line, the shell would appear to have possessed a more complicated arrangement than that in the Grammysias. From its shape and ornamentrtion I have referred this species to Clarke's *C. pohli.*[1]

Shell obliquely oval, anterior margin rounded and merging into basal margin as far as an oblique convexity from the umbo outwards, which causes the margin to project in a rounded point. Behind this the margin is carried backwards and upwards to the short hinge line. Valves convex at the umbos, which rise away from the hinge. Hinge line short, about half the greatest length of the shell. Ornamentation consisting of somewhat regular concentric furrows with fine striae between.

Matrix a brown weathered shale, stained with black manganese which coats the shell and the surface of the cleaved face of the rock.

Cat. No. 2575. Donor: Geological Commission. Locality: Ezel Fontein, Ceres.

## ORTHOCERAS, Breyn.

There is one cast of the living chamber of *Orthoceras gamkaensis* in the Bain collection in the Albany Museum, but unfortunately no specimen was sent to England when the fossils were described in 1852. Nothing was known of the Bokkeveld Cephalopods till Mr. Reed described the two species *O. gamkaensis* and *O. bokkeveldensis* collected by myself in the Gamka Poort, although a specimen of an *Orthoceras*, correctly labelled, had been for a long while exhibited in the Port Elizabeth Museum. The genus is well represented accompanying the lower Devonian fossils in North and South America, and it, apparently, also occurs in the

[1] Clarke's type figure reproduced in Katzer, Amazonasgebiet, Leipzig, 1903, p. 207, Pl. XIV., fig. 13.

Falkland Islands, associated with fossils of a strongly South African aspect. In 1841 and 1842, Dr. McCormick, surgeon to Sir John Ross' South Polar Expedion, collected "Spirifers, Orthes and Orthoceratites" in the rocks of the Falkland Islands*. This author says (p. 296) that at San Salvador Bay the lower land, consists of alternating ridges and valleys of clay slate and sandstone abounding in fossil shells, so that it is to be hoped that the meagre collections brought back by Charles Darwin and described by Morris and Sharpe, the only account as yet published on the palæontology of these interesting islands, will be supplemented, and allow of a closer correlation of these Falkland Islands rocks with our South African ones.

*Orthoceras rex*, nov. sp.

Pl. VIII., Fig. 7.

This is a very badly preserved fosssil which, however, shows characters distinct from the two forms I collected at Gamka Poort, which were described by Mr. F. R. C. Reed under the names of *O. gamkaensis* and *O. bokkeveldensis*. It was obtained by me from the Keurboom's River Heights in Knysna very shortly after I had collected the other forms, and I thought at the time that it was identical with the larger of the two, *O. gamkaensis*; as Mr. J. Rex, who showed me the locality, wished to keep the specimen for his local museum, I did not take the fossil away with me, but he has since kindly presented it to the Albany Museum.

No specific description can be given of this form; the rate of tapering is apparently 1 in 16-17, but this is much too low on account of the crushing. The proportion of width between septa to the width of the shell is about 1 to 2.46; in *O. bokkeveldensis* it is 1 to 2.6, in *O. gamkaensis* it is 1 to 5.4, so that this character would apparently place it close to the first-named species, but the crushing has made the shell appear wider than it was in life and the true porportion would probably not have much exceeded 1 to 2. There is evidence of some irregularity of the size of the air chambers, but nothing that would lead one to suppose that this

*R. McCormick, Voyages of Discovery, London, 1884, Vol. I, p. 330.

species could be a larger form of one of the other two. The siphuncle is traceable as a ridge down the centre.

Dimensions: Length, 16 cm. Greatest breadth, 4.2 cm.

Cat. No. 2812. Donor: Mr. J. Rex. Locality, Keurboom's River Heights, near the junction of the Bokkeveld beds with the Table Mountain Sandstone. Division of Knysna.

## HOMALONOTUS, Koenig.

On May 25th, 1836, Sir Roderick Murchison announced to the Geological Society of London that Sir John Herschel had discovered Trilobites in a rock which occurs to the north of the Cape of Good Hope, the specimens having been collected, apparently, by Dr. Smith, the naturalist and explorer of South Africa. Sir Roderick Murchison described the Trilobites later as belonging to the species *Calymene blumenbachi* and *Homalonotus herscheli*, n. s.[1]; a further species, he states, approaches *C. tristani*. Salter[2] remarks that the Cape *Homalonotus* is distinct from the European species. *H. knighti* was recorded by Dr. Sandberger[3] on the authority of de Verneuil from the Cape, but Salter *loc. cit.* states that this is an error. Dr. Sandberger's *H. crassicauda*[4] from the Cederbergen is also an error of identification. Salter in 1856 refigured the *H. herscheli* together with the head, which is wanting in Murchison's specimen, from material sent him by Mr. A. G. Bain; in the residue of the Bain collection and in other material in the Albany Museum I find no less than four good species distinct from *H. herscheli*. In 1897, Frech figured a large tuberculate species under the name of *H. perarmatus*[5], and in 1904 Lake described three new species—*H. quernus*, *H. colossus* and *H. sp.*[6] There is still another variety in the typical *H. herscheli* which, if the illustrations accompanying Salter's paper are correct, and Lake

[1] Sil. Syst., p. 650, pl. VII., bis, fig. 2 (1839).
[2] Geol. Soc., Trans. 2nd Ser., Vol. VII., p. 218 (1856).
[3] Neues Jahrbuch, 1852, p. 581; Q.J.G.S., Vol. IX, pt. II., p. 1.
[4] Rhein Schichten Syst., Nassau. p. 477.
[5] Lethæa geognostica, Th. I, Bd. II., Lief. 1, p. 218.
[6] Ann. S.A. Museum. Vol. IV., pt. IV., pp. 216-7.

reproduces one of them, then the form, differing from the figures of *H. herscheli*, must be a new species, but I have not named it as I believe that a reexamination of Salter's specimens will show that there has been a mistake in drawing.

The following are the Rhine species (C. Koch, ed. E. Kayser): **Homalonotus armatus*, Burm.; **H. sub-armatus*, Koch; *H. aculeatus*, Koch; *H. ornatus*, Koch; *H. römeri*, de Koninck; *H. rhenanus*, Koch; **H. crassicauda*, Sandberger; *H. scabrosus*, Koch; *H. obtusus*, Sandberger; *H. multicostatus*, Koch; *H. lævicauda*, Quenst.; *H. planus*, Sandberger.[1] Our Cape Devonian fossils, both in the general distribution of genera and mode of preservation, are extraordinarily similar to the Rhenish ones, but a critical examination of the species of *Homalonotus* demonstrates that none of them are identical. Those marked with an asterisk have been compared with the South African forms.

The following are the South African species :—

*H. herscheli*, Murchison; *H. colossus*, Lake; *H. quernus*, Lake; *H. sp.*, Lake; **H. knighti*, de Koninck[2]; **H. crassicauda*, Sandberger[3]; *H. perarmatus*, Frech[4]; *H. horridus*, n.sp.; *H. agrestis*, n.sp.; *H. lex*, n.sp.; *H. hippocampus*, n.sp.; *H. herscheli*, variety ?

* signifies mistaken identity.

*Homalonotus herscheli*, Murchison.

Pl. VIII., Fig. 8; Pl. IX., Fig. 3.

*Homalonotus Herschelii*, Murchison; Sil. Syst., p. 652, pl. VII., bis., fig. 2.

This species is difficult to recognise. Specimens apparently of this species differ from those figured and described by Salter[5]

[1] Abh. z. geol. Specialkarte v. Preussen, Bd. IV., Heft. 2, Mit Atlas, Berlin 1883.

[2] Bull. Acad. Roy. Belg., Vol. XIII., pt. 2, p. 419.

[3] Rhein. Schichten Syst. Nassau, p. 477.

[4] Lethæa geognostica, Th. 1, Bd. II., Lief. 1, p. 218.

[5] Trans. Geol. Soc., Vol. VII., 2nd Ser., p. 215, Pl. XXIV

in the following particulars.

| SALTER'S SPECIMENS. | ALBANY MUSEUM SPECIMENS. |
|---|---|
| Glabella urceolate, broadest below, contracted above, and blunt on front margin. | Glabella with straight sides, slightly broader at base. |
| Glabellar furrows: first pair directed forwards, basal and middle ones backwards; neck-furrow straight; facial sutures do not reach front margin. | Glabellar furrows all directed backwards (Lake defines the species thus, but refigures Salter's type[1]); neck furrow with strong prominence in the middle indenting the glabella; facial sutures reach the front margin. |
| Rostral plate narrow in front, occupying about one half of the front margin. | Rostral plate broad in front, occupying the whole of the front margin. |
| Oval flattened spaces at the base of the glabella, and below the eyes, are confined by the swelling of the glabella. | Oval spaces deeply indent the swollen base of the glabella. |
| Thirteen body rings. | Fourteen body rings. |
| In the pygidium, ribs continuous over the axis and sides (see *H. lex*). | Ribs interrupted at the junction of the axis with the sides. |

In the last feature Salter figures both forms, but I take it that his large perfect pygidium, Pl. XXIV., fig. 7, is the one which he wished to make his type for it is the one he describes, while fig. 4 is merely drawn to show the arrangement of the body and tail.

We have then as typical *H. herschelı* :—

Salter's figs. 1a, 1b, 2, 3 and 4, pl. XXIV.; Lake's figs. 2a, 2b, 3a, 3b, pl. XXVI.

As probably a new species, Lake's fig. 1., pl. XXVI.

As *H. lex* probably Salter's figs. 7a, 7b, pl. XXIV.

As *H. perarmatus*, Frech (=? *H. horridus*, mihi), Salter's fig. 5, pl. XXIV.

Salter himself states that in his material there are at most two species; it is a great pity that these specimens that were lying in the Albany Museum at tne time were not sent with the others; we should then have known definitely what the species *H. her-*

[1] Ann. S.A. Mus., Vol. IV., p. 215.

*scheli* was. Clarke's species *H. derbyi*[1] seems to have many of the characteristics of our type of Homalonotus, and we can therefore say that our species, which have a strong family likeness, show affinities to the South American forms.

Lake states that the nearest ally of *H. herscheli* is the Rhenish species *H. armatus*, Burmeister; the resemblances, however, are confined to the possession of spines, and the head is on so totally different a plan that no actual relationship can be claimed between the two species.

Cat. No. 2. Donor: Mr. A. G. Bain. Locality, Cederbergen. Body and tail.

This specimen is extraordinarily like that figured by Salter, Pl. XXIV., fig. 4, but has one more body ring.

Length, 12½ cm. Breadth, 8 cm.

Cat. No. 21. Donor: Mr. A. G. Bain. Locality, Cederbergen.

A complete specimen bent backwards; fourteen body rings.

Length, 12 cm. Breadth, 6.5 cm.

Cat. Nos. 66, 1432. Heads. Donor: Mr. A. G. Bain.

Cat. Nos. 1441. Tail. Donor: Mr. A. G. Bain.

Cat. No. 1616. Tail. Donor: Mr. P. Nightingale. Locality, Clanwilliam.

Cat. No. 2552. Donor: Geological Commisssion. Front portion of head of very large animal showing sutures. Locality, Ezelfontein.

Cat. No. 2553. Tail. Donor: Geological Commission. Locality, Ezelfontein, Ceres.

Cat. No. 2554. Donor: Geological Commission. Locality, Ezelfontein.

*Homalonotus horridus*, nov. sp.

Pl. IX., Figs. 1a, 1b, 1c.

This form is very closely allied to *H. herscheli*, but the pygidium has very marked differences, which are the same in the two other specimens in the Albany Museum. The remains of the body segments are unfortunately too fragmentary to enable one

[1] Kayser, Unt Amazon. Gebiet., p. 213, Pl. XV., fig. 1.

to compare this species with *H. herscheli*, but they appear to have been of the multituberculate type as in *H. perarmatus*, Frech.

The following are the characters of the pygidium :—

Tail broadly triangular, a little longer than broad, and about as deep at the proximal part as broad. Axis separated from the sides by a furrow caused by a flattening out of the ribs amounting almost to a discontinuance ; ends of the pleural ribs slightly in advance of the axial ones at the furrow. Thirteen distinct ribs, those on the sides very faint towards the apex. In the axis there are three irregular rows of strong recurved spines, a portion in the figured specimen shows a cast of these ; on the outer row they are 10 mm. long. On the thirteenth axial rib, or on the twelfth and thirteenth combined, there are too strong spines supported on an elevated base The pleural ribs bear also spines arranged in a double series along a line nearly parallel to the margin and at the height of the terminal double spine of the axis.

The ribs end on a false margin, beyond which the surface is vertical and without ornamentation. The area between the true and false margin is straight-sided, widening to the strongly marked articular facet. The last body ring covers this facet without having the ridge of the false margin.

The body rings as a whole are extraordinarily spinose ; in the smaller specimen there are the bases of no less than four spines immediately inside the fulcrum, but the larger specimen shows two large spines supported on a swollen basis as in Salter's specimen Pl. XXIV., fig. 5, The margins of the pleura are rounded.

Width 5.6 cm. Depth, 5.9 cm. Length about 7 cm.

Cat. Nos. 6, 8. Donor : Mr. A. G. Bain. Locality, Cederbergen.

Cat. No. 1444, Type. Donor : Mr. A. G. Bain, collected by Mr. P. Mader. Locality, Clanwilliam.

*Homalonotus agrestis*, nov. sp.

Pl. IX., Figs. 2a, 2b.

This form is characterised by the very rapid tapering of the pygidium and the incurved margin. Only one portion of the pygidium is known.

Axis arched, wide at the fore part with a steep downward slope, but at about the middle at the 7th rib contracted, and the slope less steep ; axis separated from the sides by a smooth area. Ribs clearly cut, with a few spines ; obliterated near the smooth margin.

Sides rounded in front, vertical behind, with a false margin commencing about the fourth rib from the front. Ribs continuous with those of the axis in front, but behind they slope strongly backwards and meet the smooth inner margin in a sigmoid curve. The first rib bears two large spines, supported on a common swollen base, and the third also bears a medium sized spine.

There are portions of four body rings on the specimen, showing the fulcra very clearly ; each of the ribs bears a large spine external to the fulcrum.

Width about 7 cm. ; length about 7.5 cm. ; depth at the front, 4.8 cm. ; at the 7th rib, 3.5 cm. ; at the 10th rib, 3.2 cm.

REMARKS.—If the present specimen were flattened by one side being folded under, and the axis brought into about the same plane as the other side, the specimen would be very similar to that figured but not named by Lake on Plate XXVII., fig. 2. The smooth area between the axis and the sides is the same, as is the strong forward bending of the side ribs towards the end of the pygidium. Lake's specimen, however, is far more spinose than the Albany Museum type. I feel sure that Lake's specimen, which I collected myself, has been flattened ; it occurs in a micaceous shale in which pressure is easily transmitted to the organic remains included in it, and while I agree with Lake that the form is clearly distinguishable from *H. herscheli*, I cannot endorse his view that the affinity of the species is with the Silurian types of Homalonotus which are characterised by their flat bodies.

It is to this species that Prof. Haug's *H. herscheli*, from the Algerian Sahara, comes nearest. I am doubtful, however, of the correctness of the view that the Saharan lower Devonian forms are of a South African or American facies. *Spirifer rousseaui*, Verneuil, and *Coleoprion gracile*, Sandberger, are Coblenzian ; *Stropheodonta oriskania*, Clarke, I admit has an American aspect, for it comes very close to our *St. concinna*, Morris and Sharpe ;

the Saharan *Leptocoelia flabellites*, Conrad, is doubtful, while the *Homalonotus herscheli* from Tassili appears to me to belong to a far more rounded form than our South African *H. herscheli*, and reminds me of the Rhine species *H. obtusa*, Sandberger. *Spirophyton*, too, occurs with the marine forms in the Sahara, as in the Eifel[1].

Cat. No. 1457. Donor: Mr. A. G. Bain ; no locality.

*Homalonotus hippocampus*, nov. sp.

Pl. IX., Figs. 5a, 5b.

This form is distinguished from the *H. herscheli* type by the sharply triangular shape and by the flatness of the glabella region. Mostly small forms.

The following are the characters of the head, the only part which we know: —

Form triangular, with margins straight ; broader than long in the proportion of eight to five. Cheeks very swollen ; free portion almost vertical and out of sight when viewed from above ; the flattened space at the base of the glabella which occurs in *H. herscheli* is fairly well seen. Glabella not well defined ; broadest at base ; indented between the eyes and blunt in front ; the upper lobes are distinct, but the basal and middle ones are not ; they are represented by a flattened surface as if an inflation had fallen in, and in the centre there is a slightly elevated ridge. The neck ring is separated from the head by a strong furrow, and on either side bears near the margin two strong spines, supported on a common swollen base. Eyes small, lunately oval, in the internal cast borne on a prominent eye-stalk, which projects outwards and a little forwards from the inflated cheek. Facial sutures distinct, beginning at the front margin, sloping outwards to the eye, and thence outwards and a little backwards to near the outer margin where it turns round, rendering the posterior portion of the free cheek spine-shaped. In-turned lower margin projects beyond the

[1] É. Haug, in F. Foureau, Mission Saharienne, Paris, 1905, p. 776, Pl. XIV., figs, 1-6.

front suture in a wide triangle from an almost straight junction with the upper part of the head-shield.

REMARKS.—This form is in typical specimens sharply separated from *H. herscheli*; all the forms which I can recognise in the Albany Museum consist of heads only, but some small specimens of the body segments bearing spines, which I have called *H. lex* may belong to this species. No. 63 of the Museum Catalogue is probably a variety; the front margin is broader than in the usual form and curves upwards to the apiculus; the front suture cuts across the base of the little triangular plate supporting the apiculus on the upper surface.

Type specimen. Width, 4 cm. Length from neck ring to base of rostral plate, 2.6 cm.

Glabella. Length, 1.7 cm. Width of base, 1.7 cm. Width of fore part, 1.2 cm.

Cat. Nos. 62, 63, 64 (Type). Donor: Mr. A. G. Bain; no locality.

Cat. No. 1613. Donor: Mr. P. Nightingale. Locality, Clanwilliam district.

*Homalonotus lex*, nov. sp.

Pl. IX., Figs. 4a, 4b.

This species is founded on body segments only; a small pygidium on the same block with a typical half-coiled up body may belong to the same form.

The rings show no particular features differing from the usual *H. herscheli* type, except in the ends, which in *H. herscheli* are rounded in the lower margin, in this species are pointed, and probably bore spines. On the back the segments bear spines, one on either side of the fulcra, with sometimes small additional ones. In the small specimen, No. 13 of the Museum Catalogue, the surface of the segments is smooth except for a row of very large spines on the inside of the fulcra. The pygidium is of the type figured by Salter, Pl. XXIV., figs. 7a and 7b., that is to say the ribs are continuous right over the surface of the pygidium, with merely an inclination at the junction of the side with the axis.

In the typical pygidia of *H. herscheli* I find that there is usually a distinct break at the junction of the side ribs with the axial ones. The pygidium attached to the big specimen, No. 1 of the Museum Catalogue, shows no trace of marginal spines. The pygidium figured, Pl. VIII., fig. 9, associated with the small specimen may, in spite of this fact, belong to the body, since this latter shows in the unwonted smoothness of the ribs, and the prominence of the two rows of great spines, that it is not quite the same as the more rugged varieties showing the same marginal spines to the ribs.

REMARKS.—The series in the Albany Museum is small but very interesting, as there are three distinct sizes. In the smallest, No. 13, the body rings measure 3 millimetres across; in the medium sized one, No. 1, they measure a little over 5 mm., and in the largest, No. 1462, they measure 11 mm. The Rhenish species, *H. scabrosus* and *H. roemeri* have angular points to the posterior ends of the pleural, but they are very different from the spines of *H. lex.*

Cat. Nos. 1, 13. Donor: Mr. A. G. Bain. Locality, Cederbergen.

Cat. No. 1462. Donor: Mr. A. G. Bain. No locality.

## PROETUS, Steininger.

### *Proetus ricardi*, Schenck.

Pl. X., Figs. 5, 5a.

Dr. A. Schenck records this form from the Bokkeveld beds[1], without, however, a description or figure. There is a vulcanite cast of this form in the Albany Museum which I figure; there is no explanation in the Catalogue of how the cast was acquired, but the fossil probably was in the possession of Dr. W. G. Atherstone, who gave the original to Dr. Schenck, retaining only the impression, as he did in the case of *Phacops crista-galli.* There is also a head of this species catalogued as coming from the Cockscomb Mountains, the place where Dr. Woodward's *P. crista-galli* came

[1]Peterm. Mitth., Bd. XXXIV., 1888, p. 247.

from, but I identify the species with *P. callitris*, n. sp. The form is sufficiently authenticated to warrant a description.

Body elongated, shuttle-shaped. Head parabolic, margins lost, genal angles produced backwards, with a broad flat triangular area behind the eyes bearing a raised triangular boss. Glabella prominent, broad behind and tapering forwards, rounded both behind and in front. Sutures not visible. Axial furrows distinct and glabellar furrows faintly perceptible. Eyes very large, elongately lunate, the two ends resting against the glabella, with depressed semi-circular palpebral lobe projecting away from the glabella and pushing the eye away from it in the centre.

Thorax with apparently eight segments; the divisions in the cast are not clearly defined, as the vulcanite has cracked from being kept so long, and a white powdery efflorescence has sweated out. Axis broad, rounded and prominent; pleuræ flattened, with ends strongly recurved, with slight grooves near the ends.

Pygidium very large, margins lost; twelve rings can be counted, but more probably existed in the original. Axis elongated conical, very prominent. Lateral lobes flattened, with some seven or more strong ribs.

REMARKS.—Allowing for the missing margins and larger size, this species is very close to, if not identical with, the form I collected at Gamka Poort, figured and described by Lake as *Proetus malacus*[1]. The differences in the shape of the glabella and pygidium are probably due to the state of preservation in the two specimens, while the resemblances are very striking. The locality, Cockscomb Mountains, does not convey much information, as Bokkeveld beds occur on both sides of this range which lies to the west-north-west of Uitenhage.

Dimensions: Total length, 6.9 cm. Length of glabella, 1.6 cm. Length of thorax, 2.5 cm. Breadth of axis of thorax, 1.7 cm. Breadth of pygidial axis (6th ring), 1.2 cm. Length of eye, 1 cm. Breadth of eye, 0.4 cm.

Cat. No. 35. Donor: Dr. W. G. Atherstone. Locality, Cockscomb Mountains.

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[1]Ann. S.A. Mus., Vol. IV., Pt. IV., p. 213, Pl. XXV., fig. 10.

## PHACOPIDÆ, Salter.

### *Phacops crista-galli*, Woodward.

Pl. X., Fig. 6.

There are two fine plaster casts of the original in the Albany Museum from which I figure the part of the head seen from above, to enable one to compare this species with the other *Phacops*. Lake figures a specimen collected by me in Gamka Poort as this species[1], but I can see no resemblances either with the plaster cast or with Dr. Woodward's figure. According to Lake, the Gamka Poort species "exactly resembles the specimen described by Dr Woodward, except that the tuberculation is much less distinct, the axial spines are shorter, and the tail is not produced into a long mucro but only into a short point. From these characters we may conclude that it is a younger specimen." As the external casts of *Phacops acacia* show all the characters of the Gamka Poort species without reservation, the latter form must be placed in this species, and will probably be referred to *P. africanus* when the doubts that I raise when describing *P. acacia* have been settled. I agree wholly with Lake that *P. crista-galli* is different from *P. arbutus*, if the pygidium which Lake figures does really belong to the latter species. In *P. crista-galli* the sides of the tail are marked with strongly convex ridges; the first four bear three very prominent tubercles, probably the bases of spines, the fifth is curved backwards near the margin, and bears two tubercles, the sixth is almost obsolete, but bent backwards in a sigmoid curve, and bears still two tubercles, while the seventh is faintly raised above the surface of the broad base of the terminal spine. The spine is curved upwards and is uniform in thickness throughout its length of 1.2 centimetres. The axial spines are a little over one centimetre in length reckoned from the back of the next segment behind. The rings are very swollen and the tuberculation very prominent in contrast with the flattened rings of *P. acacia* and Lake's *P. crista-galli*.

Locality, Cockscomb Mountains, along with *Proetus ricardi*,

[1] Ann. S.A. Museum, Pt. IV, Vol. IV., 1904, p. 205, Pl. XXIV, fig. 5.

Schenck, and stems of encrinites.

Cat. No. 5. Bearing the inscription: *Encrinurus crista-galli*, H. Woodward. Brit. Assoc. Reports, 1872, from Cockscomb Mountains, Cape of Good Hope. Original in the collection of Dr. W. G. Atherstone, F.G.S., Grahamstown.

*Phacops (Cryphaeus) callitris*, nov. sp.

Pl. X., Figs. 2, 2a, 2b.

Two nearly perfect heads, widely differing from all other South African species.

Head triangular; proportion of length to breadth about 2 to 3; genal angles rounded, with small, sharp spines directed outwards from the bend in the margin. Glabella acutely domed in front, with irregular sides, divided from the cheeks by a distinct furrow; broadens out forwards from the third axial furrows. First pair of axial furrows long and shallow, directed outwards and obliquely forwards, axial ends bent backwards. Second pair short and shallow, not reaching the marginal furrows; directed less obliquely forwards than the first pair; axial ends bent backwards. Third pair very deep, reaching the marginal furrows, still directed slightly forwards; axial ends twisted backwards and then forwards. Axial portion flat, slightly more depressed than the terminal lobe. Neck furrow deep and straight, with marginal ends curved forwards; becomes broader and less deep over the axis. Neck segment smooth, deeply indented at the axial furrows. Cheeks rounded and smooth, somewhat swollen behind the eyes and steep in front of them, with a definite border on the sides almost as distinct as the neck segment, but without the furrow. Eyes prominent, lunate: facets borne on a plate slanting upwards towards the axis; viewed from above they appear semicircular with equal vision forwards and backwards. Sutures run inwards and a little backwards from the margin to the base of the eye, thence forwards and outwards and round the front margin of the glabella. Reflexed portion with a narrow vertical border in front, thence directed horizontally backwards: cheeks level with the reflexed margin. Inner margin of the under surface

regularly arcuate, with a triangular depression, causing the front margins to appear prominent. Surface smooth, except in front of the glabella, which is covered with irregular granules.

REMARKS.—This species agrees in many particulars with Lake's form *P. ocellus*, Salter's *P. africanus* (pars) Plate XXIV., fig. 6. The character of the eyes and the glabella especially are almost the same, but *P. ocellus* wants the marginal border to the cheeks, and the first pair of axial furrows are short and sharply bounded instead of being shallow and long, and the eyes are placed more forwards. These, however, are small differences and insufficient to separate *P. callitris* from *P. ocellus*, had not Lake seen several precisely similar heads in the British Museum, all without the marginal spike. Salter adds in his figure a pair of backwardly directed spines issuing from the genal angles; these were probably put in from an impression of the outer surface. In *P. acacia* I repeatedly obtained casts of the head with the genal angles rounded, owing to air filling in the hollows and preventing the plaster to penetrate, and it was not till I first filled in the cavities where the spines had been that I obtained a cast showing these distinctly, so that in natural casts the spines would not be represented. In *P. callitris* the genal angles converge to the spike so markedly that this feature could not be overlooked in a series of specimens. I have named the species after the Cape Cedar, *Callitris (Widdringtonia) juniperoides.*

Dimensions: Length, 2·4 cm. Breadth, 3.6 cm. Width of glabella at base, 1.6 cm., in front, 2.2 cm. Length of glabella from neck furrow to front suture, 2 cm., from neck furrow to base of first axial furrow, 8 cm. Width between eyes (inner margin of facets), 2.4 cm.

Cat. No. 29, Type. Locality, Cederbergen. Donor: Mr. A. G. Bain.

Cat. No. 34 (Labelled *Proetus ricardi*, Schenck). Locality Cockscomb Mountains. Donor; Mr. Pinchin.

*Phacops (Cryphaeus) ceres*, nov. sp.

Pl. X., Figs. 1, 1a.

This species is represented in the Albany Museum by two

heads, with the margins unfortunately incomplete. It is distinguished easily from *P. africanus* by the more pointed glabella and by the occipital furrow being continuous over the axis.

Head triangular; breadth approximately 1½ times the length, not counting the terminal spine, which is missing. Glabella elongated, broadening in front, straight-sided, moderately raised above the cheeks, and separated from these by the swelling rather than by a definite furrow. The front pair of axial furrows directed obliquely forwards; the second pair almost perpendicular to the axis and shallow; the third pair very deep, almost perpendicular to the axis, the axial ends turned inwards and forwards. Occipital furrow straight, fading out towards the margins of the cheeks, very deep on either side of the axis, but still strongly marked where it bends forwards to pass over the axis. Neck segment smooth. Cheeks curved evenly downwards, steep near the front part, making the frontal lobe of the glabella prominent. Suture runs inwards and downwards to the base of the eye, then straight upwards and round the end of the glabella just above the margin. Eyes prominent with facets borne on an upright, outwardly directed surface. Palpebral lobe asymmetrical with vision greatest in front; lower edge of eye a little in front of the third axial furrow. Viewed from the side the glabella meets the reflexed border in a rounded margin slanting upwards from below, the cheeks forming wings which reach lower down than the reflexed border of the cephalic shield. The apex is upturned and probably bore a small spoon-shaped projection, as in *Cryphaeus giganteus*, Ulrich, and *C. caffer*, Salter. Surface smooth, except the frontal lobe of the glabella, which is irregularly granulated.

REMARKS.—The absence of any sign of a spine on the neck segment separates this form from *P. arbuteus*, Lake. It is not represented in the Bain collection described by Salter. It is very close to *Phacops (Cryphaeus) giganteus*, Ulrich, from the Icla shales of Chuaraui, Bolivia[1].

Dimensions: Length, 1.8. cm. Breadth, 3.3 cm. Width of glabella at base, 1.1 cm., in front, 1.4 cm. Length of glabella from

[1] Ulrich, A., Versteinerungen aus Bolivien, Neues Jahrb. VIII., Beil. Bd., 1892, p. 4, Pl. I., figs. 6-8, especially fig. 8.

neck furrow to front suture, 1.55 cm., from neck furrow to base of first axial furrow, 0.5 cm. Width between the eyes (inner margin of facets), 1.9 cm.

Cat. No. 27. Locality, Gydow Pass, Ceres. Donor: Mr. A. G. Bain.

Cat. No. 67, Type. No locality. Donor: Mr. A. G. Bain.

*Phacops (Cryphaeus) gydowi*, nov. sp.

Pl. X., Figs. 3, 3a, 3b, 3c.

This species is represented by a well preserved head and two rather indistinct specimens of the whole animal. It is similar to *P. callitris* in some respects, but is much more elongated, and the eyes are quite different.

Head pentagonal; breadth only a little more than the length (1.9 to 2.5). Glabella elongated, acutely domed in front, occupying about half the breadth of the head, very slightly broader in front than at the base; sides irregular, separated from the cheeks by a furrow which is very strongly marked at the base. Glabellar furrows well marked; first pair shallow and diverging forwards; second pair nearly perpendicular to the axis, not reaching the marginal furrow; third pair perpendicular to the axis in the centre, then directed forwards and merging into the marginal furrow. Occipital furrow, sharply indented, straight, but turning forwards at the genal angles, with deep pits at the axial furrow, and becomes broader but still deep over the axis. Neck ring forms a broad band over the axis narrower on the cheeks, but broadening out towards the margins. Cheeks moderately curved, almost vertical below and in front of the eyes, bearing outwardly turned margins. Eyes very large and deep, lunate; facets borne on plates sloping inwards and upwards; about two-thirds of the visual surface directed forwards and about one-third backwards; upper margin with a raised rim above the palpebral lobe. A furrow proceeds from the front part of the eye continuing the marginal furrow, and indents the swollen end of the glabella. Sutures lost, except the front one, which runs round the front of the head.

Under reflexed surface rounded at the side-margins which are slightly raised; inner margin with a central triangular process bent downwards. Surface of glabella finely granulated; cheeks smooth.

Body elongated, axis elevated and rounded, narrow, with no indication of separation into thorax and pygidium.

In the most complete specimen I count 13 segments. Sides flat on either side of the axis, then strongly bent downwards; ends of pleuræ turned forwards with apparently a backwardly directed spine.

REMARKS.—The coiled up thorax and tail figured by Salter, Pl. XXV., fig. 9, seems generally to agree with the thorax of this species, but the Albany Museum specimens are too indistinct to show the ornamentation of Salter's type if it had been once there. The margin of the head being turned forwards, the pleuræ have to take on the same curve, and hence all the forms with this shape of head, *P. caffer*, *P. callitris* and *P. gydowi*, would have bodies indistinguishable one from the other as far as the forward curvature of the pleuræ is concerned, but the heads are quite distinct. I do not therefore think Lake is justified in definitely claiming the original of fig. 9 of Salter as belonging to his new species *P. ocellus*.

I have named the species after the Gydow, a steep pass leading from the Warm to the Cold Bokkevelds, Ceres, in the road cuttings of which so many fossils have been obtained.

Dimensions: Head. Length, 1.9 cm. Breadth, 2.4 cm. Width of glabella at base. 1.1 cm., in front, 1.3 cm. Length of glabella from neck furrow to front suture, 1.7 cm.; from neck furrow to base of first axial furrow, 0.7 cm. Width between eyes (inner margin of facets), 1.8 cm. Body (No. 26). Total length of head and body, 4.8 cm. Length of body (13 rings), 3.2 c.m. Width of axis, 0.9 cm. Width of whole thorax, 2.1 cm.

Cat. No. 25. Cat. No. 26. Type for body. Cat. No. 28. Type for head. Locality, Gydow Pass, Ceres. Donor: Mr. A. G. Bain.

*Phacops acacia*, nov. sp.

Pl. X., Figs. 4, 4a.

*Phacops (Cryhaeus) africanus*, Salter (pars.), Trans. Geol. Soc., Ser. 2, Vol. VII., pl. XXV., fig. 5.

*Phacops crista-galli*, Woodw., Lake, Ann. S.A. Mus., 1904, Vol. IV., p. 205, pl. XXIV., fig. 5.

This species bears the backwardly directed genal spines which Salter dotted in in two of his figures of the head of *P. africanus*[1]. A third form is shown with the genal spines affixed, but Lake[2] makes this into a new species, *P. pupillus*. There is no statement made as to the reasons which led Salter to dot in the spines; Lake, from a reexamination of Salter's types, states that they are not there, at least in the original of fig. 6; the original of fig. 1 cannot be identified. The neck segment bears a strong median spine, as figured by Salter in fig. 6.

The specimens in the Albany Museum consist of the impression of the lower part of the head and thorax in clay nodules, one of which contains two heads. I abstracted a small portion of the natural cast of the head of one of these which I figure. I attempted to take a cast of the impression of the more complete head, but there are so many projections overhanging the cavities that I was unable to make a satisfactory replica of the original. I then tried to take casts of portions separately, but the hollows where the genal spines were once, formed air-cushions, which prevented the material from entering, and I repeatedly obtained casts showing the genal angles rounded. It was only by first filling in the hollows of the spines that I was enabled to ultimately obtain a true representation of the original. This fact may perhaps explain why the natural internal casts of the head do not show the spines, but possibly Salter, with an impression of the exterior to judge from, dotted in the spines. If this theory of mine is correct, *P. africanus* will have to be re-defined, and my species *P. acacia* will have to drop out. In other words, *P. africanus*, Salter,

[1]Salter, J.W., Trans. Geol. Soc., 1856, 2nd Ser., Vol. VII., pl. XXV., figs. 1 and 6.

[2]Lake, P., Ann. S.A. Mus., Vol. IV., 1904, p. 203, pl. XXIV., fig. 1.

restrict. Lake, may be the internal cast of the same form which I have defined as *P. acacia* from impressions of the external surface.

One nodule contains the type, but shows only the lower margin of the head, one eye, and the thorax rolled up. The second nodule contains two heads and two thorax, but in both cases the heads are placed where the tails should be; the remains are in a very fragmentary condition, but they show the neck spines and other characteristics of the neck ring, the eyes, the margins of the pleuræ and the dorsal spines.

Head. Marginal shape unknown. Glabella moderately convex. Frontal lobe wider than the section across the base. Third pair of glabellar furrows very deep, almost vertical to the axis, neck furrow runs forwards to the axis, narrowing the bases of the third pair of lobes. Eye very prominent, base on a level with the end of the third glabellar furrow; palpebral lobe ear-shaped, expanded, asymmetrical. Neck furrow rounded, deep, straight on the cheeks; on nearing the axial furrow it turns sharply backwards, and is continued over the hinder margin of the head as a little nick and along the reflexed portion of the shield. The neck furrow starts again on the inside of the axial furrow as a deep depression overhung by the swollen third glabellar lobe, but it becomes flattened out along the median line. The genal spines have a width of over 4 millimetres at base and are over 5 mm. long, measured from the inside border; they form a flattened triangle about 2 mm. deep. The axial neck spine is borne on an expanded base bordered by the nicks in the margin where the neck furrow bends backwards; it was shorter than the spines on the thorax. The under side of the base of the axial spine shows a raised margin. Surface covered with very fine granules, which are also well shown on the outer margin above the spines.

A considerable portion of the under surface of the head is shown; it is quite smooth and gives a depth of head on the outer side of the eyes of 8 mm. The hinder margin of the neck segment is rounded, about 2 mm. thick, but near the genal spines it becomes thicker and flatter, with the surface inclined forwards.

Dimensions: Width between bases of genal spines 5.8 cm.

Width between base of genal spine and outer lower margin of eye, 1.2 cm.

Thorax. Eight segments shown in type, ten in a second specimen, nine in a third. Segments in the axis formed by a narrow prominent semi-circular ring, bearing a prominent spine ; in front there is a scoop-shaped portion which articulates with the segment in front. The prominent rings expand near the margin of the axis, and on the sides first bend horizontally outwards and then curve steeply downwards. The convex axial ring divides on the sides into two portions, separated by a deep groove, the hinder portion more swollen than the one in front ; in rolling up, the front half of the pleura slides under the swollen back portion of the pleura in front. When a rolled up specimen is viewed from the side, it looks as if the sides were formed only by the swollen back portions of the pleuræ. The triangular portion of the front part of the pleuræ, which is then visible, has the appearance of being a scale overlapping the segment in front, as Salter's draftsman actually depicted in Pl. XXV., fig. 9c., and even Lake's draftsman Pl. XXIV., fig. 10b, shows the same thing ; but when a specimen that is not rolled up is studied, there is no sign of the projecting scale.

The specimens are too fragmentary to give dimensions, but the longest spine in the type is 7 mm. long, measured from the base to the tip.

Cat. No. 2124, Type. No locality or donor given in catalogue.

## DESCRIPTION OF PLATES.

### Plate VI.

1. *Lepidodendron albanense*, n. sp. The illustration shows the better preserved part of the surface. At A the surface has been turned over, and a sketch is shown alongside of the appearance of the leaf-bases from this direction.

Cat. No. 150. Witteberg beds. Quarry south of Grahamstown.

2. *Lepidodendron kowiense*, n. sp. 2a shows one of the vascular protuberances enlarged.

Cat. No. 143. Witteberg beds, Cold Bokkeveld, Ceres.

3. *Didymophyllum expansum*, n. sp.

Cat. No. 161. Witteberg quartzites, Steytlerville.

3 a, b, c. The areoles and rootlets enlarged four times; a, surface view showing the two apertures; b, the paired rootlets seen from above; c, the rootlet seen from the side.

4. *Bothrodendron irregulare*, n. sp.

Cat. No. 165. Estment's Farm, Kowie, Port Alfred.

5. *Bothrodendron cæspitosum*, n. sp.

Cat. No. 145. Cold Bokkeveld, Ceres.

5a, the same enlarged three times.

### Plate VII.

1. *Spirifer antarcticus*, Morris and Sharpe. Outer surface of brachial valve and hinge area.

Cat. No. 134. Bokkeveld beds, Montagu.

2. *Spirifer antarcticus*, Morris and Sharpe. Diagrammatic section through the cast. External surface shown in dotted lines and cast of the beak in black.

3. *Spirifer orbignyi*, Morris and Sharpe. Natural internal cast of the pedicle valve.

Cat. No. 2128. Bokkeveld beds, Montagu.

4. *Spirifer orbignyi*, Morris and Sharpe. Natural cast of the brachial valve.

Cat. No. 2128. Bokkeveld beds, Montagu.

5. *Spirifer orbignyi*, Morris and Sharpe.

Diagrammatic section through ventral valve showing the internal cast, the outer surface in outline, and the cast of the beak in black.

6. *Spirifer ceres*, Reed.

Cat. No. 49. Bokkeveld beds. Warm Bokkeveld, Ceres.

7. *Rensselaeria relicta*, n. sp.

Cat. No. 93. Bokkeveld beds, Warm Bokkeveld, Ceres.

8. *Rensselaeria hottentot*, n. sp. Enlarged twice.

Cat. No. 2578. Bokkeveld beds, Hottentot's Kloof, Ceres.

9. *Trigeria simplex*, n. sp. Cast of brachial valve, enlarged twice.

Cat. No. 2589. Bokkeveld beds, Gydow Pass, Ceres.

10. *Trigeria silveti*, Ulrich, enlarged twice. 10a, pedicle aspect; 10b, brachial aspect; 10c, seen from posterior margin.

Cat. No. 2127. Bokkeveld beds, Montagu.

11. *Ambocoelia umbonata*, Conrad.

Cat. No. 2591. Gydow Pass, Ceres.

12. *Zaphrentis zebra*, n. sp.

Cat. No. 1586. Bokkeveld beds, Cockscomb Mountains.

13. *Conularia africana*, Sharpe. Entire shell much abraded, with only traces of the ornamentation.

Cat. No. 1483. Locality unknown, probably Gydow Pass, Ceres.

14. *Conularia africana*, Sharpe. View of the aperture showing the laterales ending in flaps which turn over.

Cat. No. 116. Cederbergen, Clanwilliam.

15. *Conularia africana*, Sharpe, (*Conularia pinchiniana*, Ms. Albany Museum).

Cat. No. 1479. Cederbergen, Clanwilliam.

Plate VIII.

1. *Bellerophon reissi*, Clarke.

Cat. No. 128. Bokkeveld beds, Warm Bokkeveld, Ceres.

2. *Bellerophon trilobatus*, Sowerby.

Cat. No. 139, Bokkeveld beds, Warm Bokkeveld, Ceres.

3. *Cypricardella pohli*, Clarke.

Cat. No. 3575. Bokkeveld beds, Ezel Fontein, Ceres.

4. *Palaeoneilo boyesi*, n. sp.

Cat. No. 86. Bokkeveld beds, Hottentot's Kloof, Ceres.

5. *Palaeoneilo arcuata*, n. sp.

Cat. No. 103, Bokkeveld beds, Hottentot's Kloof, Ceres.

6. *Nuculites lunulata*, n. sp.

Cat. No. 135. Bokkeveld beds, Leo Hoek (? Leeuwfontein), Ceres.

7. *Orthoceras rex*, n. sp.

Cat. No. 2812. Bokkeveld beds, Keurboom's River Heights, Knysna.

8. *Homalonotus herscheli*, var ?

Cat. No. 2554. Bokkeveld beds, Ezel Fontein, Ceres.

9. Trilobite pygidium associated with the body of *Homalonotus lex*, n. sp.

Cat. No. 13. Bokkeveld beds, Cederbergen, Clanwilliam.

## Plate IX.

1. *Homalonotus horridus*, n. sp. 1a, dorsal aspect of the pygidium showing two of the spines represented by tubules in an attached block of matrix. 1b, the underside, showing the inturning of the margins. 1c, viewed from the side, showing the swollen base of the spines situated near the apex, and the group of four spines on the lateræ.

Cat. No. 1444. Bokkeveld beds, Clanwilliam.

2. *Homalonotus agrestis*, n. sp. Dorsal aspect of the pygidium. 2a, under surface.

Cat. No. 1462. Bokkeveld beds. No locality.

3. Under surface of *Homalonotus herscheli*, Murchison, copied from Lake, Ann. S.A. Mus., Vol. IV., Pt. IV., Pl. XXVI., fig. 3b.

4. *Homalonotus lex.* n. sp. 4a, end of one of the body segments.

Cat. No. 1462. Bokkeveld beds. No locality.

4b. The first four body segments of a smaller indidual.

Cat. No. 1. Bokkeveld beds, Cederbergen.

5. *Homalonotus hippocampus*, n. sp. 5a, dorsal aspect of the head. The marginal spines on the neck ring are badly shown. 5b, lateral aspect of the same.

Cat. No. 64. Bokkeveld beds. No locality.

## Plate X.

1. *Phacops ceres*, n. sp. 1, dorsal aspect. 1a, lateral aspect.

Cat. No. 67. Bokkeveld beds. No locality.

2. *Phacops callitris*, n. sp. 2, dorsal aspect. 2a, lateral aspect. 2b, under surface of the head shield.

Cat. No. 29. Bokkeveld beds, Cederbergen, Clanwilliam.

3. *Phacops gydowi*, n. sp. 3, dorsal aspect. 3a, under surface of head shield. 3b, lateral aspect.

Cat. No. 28. Bokkeveld beds, Gydow Pass, Ceres.

3c, the 6th, 7th, 8th and 9th body segments of an obscure specimen, showing the forward curving of the pleuræ at their ends.

Cat. No. 26. Gydow Pass, Ceres.

4. *Phacops acacia*, n. sp. 4, dorsal aspect of internal cast of part of the head, with further details drawn in from artificial casts of the impression of the outer surface.

4a, Artificial cast of the impression of the body of the same specimen seen from the side.

Cat. No. 2124. Bokkeveld beds. No locality.

5. *Proetus ricardi*, Schenck. Vulcanite cast of the specimen mentioned by Schenck. 5, dorsal aspect. 5a, lateral aspect.

Cat. No. 35. Bokkeveld beds, Cockscomb Mountains.

6. *Phacops crista-galli*, Woodward. Plaster cast of the original specimen taken before it was sent to England. Dorsal aspect of the head shield.

Cat. No. 5. Bokkeveld beds, Cockscomb Mountains.

## South African Tortoises of the Genus *Homopus*, with Description of a New Species.

By J. E. DUERDEN, Ph. D., A.R.C. Sc.

Among the twenty or so species of tortoises recorded from South Africa there occur two very distinct groups. One group includes the species embraced under the genus *Homopus*, and the other *Testudo geometrica*, Linn., and its allies. As regards the genus *Homopus* five species are known, and the present paper adds another; they are restricted in their distribution to South Africa, with the exception of *H. nogueyi*, which occurs in Upper Senegal, and differ from one another in characters which seem very constant. Of the *geometrica*-group, nine species have been described, all found in South Africa. While some of these appear very distinct, there are others which are unquestionably intermediate in character when large numbers of individuals are available for comparison; their claim to specific recognition must be held as doubtful. South Africa may be considered as the centre of origin of these two strongly marked groups of tortoises, and one may assume that each series has had its own ancestry. An acquaintance with these facts strongly suggested that a thorough investigation of the two series on the spot might yield important results with regard to their geographical distribution, and perhaps reveal phases in the origin of the different species or the intergrading of one species into another.

To carry out such an investigation it is necessary that a large number of individuals should be secured from as many localities as possible, and with this in view "Museum Notes" were inserted in the local papers drawing attention to the zoological interest of the subject, and appealing for assistance to the residents in various parts of the Colony. The response was very gratifying. Within about four months over four hundred live specimens were received from about fifty different sources, and the contributions still continue. The Director of the South African Museum, Mr. W. L.

Sclater, very kindly placed at my disposal for study the collection of tortoises, 53 specimens, in his charge.

Thanks are due to the many contributors who have rendered possible the study to its present extent. The notes in the present contribution are confined to the genus *Homopus*, and are somewhat preliminary in character. A large number of facts are accumulating with regard to the *geometrica*-group.

Among the individuals of *Homopus* are a few with characters different from any known form, and of such a nature as to justify the establishment of a new species. I have named it after Prof. G. A. Boulenger, F.R.S., who has done so much for South African herpetology, and assisted me with literature in the present studies.

### *Homopus boulengeri*, n. sp.

*Shell* very depressed, more than twice as long as deep, flat on the vertebral region, posterior margin reverted, nearly vertical and not or feebly serrated, anterior margin not or feebly serrated; dorsal shields not swollen, concentrically striated, separated by rather deep, narrow grooves; areolae either moderately or deeply impressed: vertebral shields broader than long, as broad or a little narrower than the costals; a small, short nuchal, about as broad behind as long. Marginal plates 12 or 13, rarely 11. Plastral lobes short, from half to one-third the width of the bridge, front lobe truncate, hind lobe openly notched in the female, deeper in the male; the longest median suture is between the abdominals, and is a little over three times that between the pectorals, the suture between the caudals is about the same as that between the pectorals and the gulars, the suture between the femorals is the same or a little shorter than that between the humerals; axillaries small, inguinals large, in contact with the femoral, the abdominal, and two marginals. A pair of small prefrontal scales on the snout, usually preceded by a small median and two lateral plates of nearly the same size as the prefrontals. Beak strongly hooked, feebly tridentate.

*Fore limbs* covered anteriorly with large, elongated, subequal, imbricate scales or tubercles: five claws to the fore limb, four

rarely five, to the hind limb ; a large conical tubercle on the hinder side of the thigh, surrounded with smaller tubercles in the male.

*Colour* : Carapace nearly uniformly dark reddish or yellowish brown in living specimens, yellowish in old dead shells, antetior three or four neural shields may be narrowly edged with black in front and on the sides ; plastral shields uniformly dark olive or yellowish, often dark brown anteriorly; naked parts of skin bright yellow when alive, with minute orange scales.

*Length* : Largest shell 10.5 cm.

*Distribution* : South Africa—Districts of Willowmore, Aberdeen, and Beaufort West.

*Localities* : Willowmore, male and female, presented by J. D. Hugo, Esq., C.C., R.M. Beaufort West, male and two females, presented by P. D. Morris, Esq. Locality unknown, one female ; one carapace, female. Zwart Ruggens, Aberdeen, carapace, male (South African Museum, pres. E. T. Dunn, 1881).

The relationships and distinctive characteristics of the new species can be best expressed in the following synopsis.

### Synopsis of Species of Homopus.

I. 1. Carapace depressed, of equal depth throughout.

a, *fore limb with four claws* ; *inguinal shield very small.*

1. Posterior margin of carapace not serrated ; a large femoral tubercle present or absent ; a large prefrontal shield, partly divided longitudinally from behind ; beak strongly hooked ; carapace olive, areolae reddish brown, plastron brown in the middle, yellow towards the periphery ; length, 10 cm. *areolatus.*

2. Posterior margin reverted and serrated ; a very large conical tubercle on hinder side of thigh ; a pair of large prefrontal shields, followed by a large frontal ; beak feebly hooked ; dark or pale brown above, plastral shields yellow, brown anteriorly ; each shield edged with black ; length, 13 cm. *femoralis.*

b, *fore limb with five claws* ; *inguinal shield large, in contact with femoral.*

3. Posterior margin of carapace feebly serrated ; no large conical tubercle on thigh ; a large frontal and a pair of prefrontal scales ; beak scarcely hooked ; carapace black, each shield with a

yellowish-brown areola; plastron black and yellow; length, 9.3 cm. *darlingi.*

4. Posterior margin of carapace serrated; a very large conical tubercle on thigh; forehead covered with numerous small and irregular shields; shell yellow, shaded with brown on the plastron, elegantly freckled and radiated with blackish brown on the carapace; length, 10 cm. *signatus.*

5. Posterior margin of carapace not or but feebly serrated; a large conical tubercle on thigh; a pair of prefrontal scales; beak strongly hooked; colour nearly uniformly dark-reddish or yellowish brown above, plastral shields nearly uniformly dark yellow or brown; length, 10.5 cm. *boulengeri.*

II. 6. Carapace very convex, gibbose behind, posterior margin not serrated; inguinal shield large, in contact with the femoral; fore limb with four claws; a pair of large prefrontal scales, followed by a smaller frontal; no enlarged femoral tubercles; dorsal shields reddish brown, yellowish green in centre; plastron yellowish with reddish-brown spots; length, 13.5 cm. *nogueyi.*

From the synopsis it will be seen that *Homopus boulengeri* is a well defined species, perhaps most nearly related to *H. signatus*; but the latter is conspicuously separated from the other species of *Homopus* by its freckled carapace, a type of colouration not hinted at elsewhere in the genus. Allowing for slight variations, the characters of the scales on the forehead (prefrontal and frontal) seem to constitute reliable specific distinctions in the genus, and those of four species are represented on the accompanying plate. A strongly marked concavity in the hinder part of the plastron of the male *H. boulengeri* distinguishes the species from others of the present genus, though common enough elsewhere; the shell of the male is also flatter than that of the female. In one specimen 4 nails where present on one hind limb, and 5 on the other. Though large, the femoral tubercle is not so strongly developed as in *H. femoralis*; in one specimen, a male, the tubercles are altogether wanting.

From present indications the species seems to have a very restricted distribution in South Africa, being as yet known from only the adjacent districts of Willowmore, Beaufort West, and

Aberdeen. None of the other representatives of the genus have been received from these districts.

Two of the specimens, one living and the other only a shell, seem at first sight very distinct forms, but the differences can evidently be regarded as expressions of senility. The coloration s a uniform pale yellow in the old shell, and a blackish brown in the living example. The concentric lines on the shields have almost disappeared, and the areolae are scarcely recognizable, while their margins are much swollen or nodulated, giving a very irregular appearance to the upper surface of the carapace; the grooves between the shields are deeper but narrower, and the nuchal is either nearly square or much reduced; the marginals united with the bridge are rounded, having lost their feeble angularity. The sutures between the plastral shields are deeper and the surface of the plastron is pitted.

The scales or tubercles on the fore limbs are much shortened, so that they scarcely overlap; the claws are also much shorter than in ordinary specimens, and the tubercle on the thigh is much reduced.

In almost all species of tortoises somewhat similar evidences of old age occur, but not often to so marked a degree as in the present form.

Considering the genus *Homopus* as a whole, each species, as shown in the synopsis, has clearly defined, distinctive characteristics. Where many individuals are available for comparison *(areolatus, femoralis, boulengeri)* certain variations occur among the members of a species, yet these seem in no way suggestive of relationship with the other species, except perhaps in the case of the femoral tubercles in *areolatus*. In this species all stages can be found from tubercles almost as large as those met with in *femoralis* to their total absence, and, as stated above, they are wanting in one specimen of *boulengeri*. In all the other specific characters there is little or no evidence of intergrading. As will be shown in a later paper this is in marked contrast with the .conditions prevailing in the *geometrica*-group, where with a large number of specimens for study specific distinctions are found to be very difficult to establish. If we assume

that the species of *Homopus* are derived from a single stock their fixed characteristics may be taken to indicate the establishment of the species at a distant period, so that their differences have become fixed and intermediate forms have died out; the many members of the *geometrica*-group on the other hand would seem to be a more recent series whose specific characters are not yet fully established or in which overlapping forms have not yet disappeared.

The well defined character of the six species of *Homopus* is further emphasized by their geographical distribution, as each is found to occupy a very distinct area. *Areolatus* is known from the Districts of Albany, Alexandria, Uitenhage, Cape Town, and Malmesbury, and probably occurs along the whole extent of the south eastern and south western coasts, extending inland until the higher regions are reached. *Femoralis* has been obtained from the Districts of Aliwal North, Wodehouse, Cradock, Middleburg, Hanover, Colesberg, and as far to the north as Barkly West (Warrenton). It thus occupies the north-eastern part of Cape Colony, and very likely will be found extending into the Orange River Colony. *Boulengeri* so far as established has a well defined distribution south of this in the adjacent Districts of Willowmore, Aberdeen, and Beaufort West, a region included within the Karoo Plain. The single specimen of *darlingi* was found far to the north of the *femoralis* area, coming from Mashonaland, Rhodesia. *Signatus* is yet known only from Ookiep, Namaqualand, in the extreme north western part of Cape Colony, while *nogueyi* comes from Medina, Upper Senegal.

Though the specimens hitherto received can be considered as only very incompletely representative of the wide area of South Africa, still the results are significant as far as determined. As yet there is no overlapping of one species with another; no two species have been obtained from any one district. Moreover, the areas indicated above are characterised by distinct geographical and floral features. It is remarkable how closely they conform with the Floral Regions recognised by Dr. H. Bolus in his paper "Sketch of the Floral Regions of South Africa."[1] The South

[1] *Science in South Africa*, Capetown, 1905.

Eastern and South Western Regions of Bolus are the home of *areolatus*, his Karoo Region contains *boulengeri*, the Upper Region is characterized by *femoralis*, in the Western Region bordering on the Kalahari Region is found *signatus*, while *darlingi* in Mashonaland is in a different region from these. The suggestiveness of the facts already established are sufficient to warrant the prosecution of the enquiry; they lend support to the recent dictum of President D. S. Jordan[1]: "In nature a closely related distinct species is not often quite side by side with the old. It is simply next to it, geographically or geologically speaking, and the degree of distinction almost always bears a relation to the importance or the permanence of the barrier separating the supposed new stock from the parent stock."

It is questionable how far any of the characters relied upon as of specific value can be considered as adaptive or helpful to the animal in the struggle for existence. The colours vary from yellow and green through brown to black, and may be partly protective to the individual when walking over the veld, or resting partly hidden under vegetation or rocks; the femoral tubercles are certainly protective, covering as they do an otherwise vulnerable part of the creature when retracted. It can, however, scarcely be of much importance to the individual animal whether it has four or five claws to the fore limbs, large or small inguinal shields, a few large or many small head shields, or slightly larger or smaller plastral shields. The specific characters are probably best regarded as expressions of tendencies along certain lines of development which have now become more or less fixed in the different species as a result of isolation and adaptation, and can be relied upon for taxonomic purposes.

EXPLANATION OF PLATE XI.

Fig. 1. *Homopus boulengeri*. Ventral view.
Fig. 2. *Homopus boulengeri*. Side view.
Fig. 3. Head scales on *H. darlingi*.
Fig. 4. „ „ *H. areolatus*.
Fig. 5. „ „ *H. boulengeri*.
Fig. 6. „ „ *H. femoralis*.

[1] "The Origin of Species through Isolation." *Science*, p. 546, Nov. 3, 1905.

## On the Hymenoptera of the Albany Museum, Grahamstown, Cape Colony.

BY P. CAMERON.

(Fourth Paper.)*

### CHRYSIDIDAE.

*Hexachrysis whiteana*, nov. sp.

Front, vertex and upper part of thorax purple, the face, clypeus, occiput and pleurae dark green ; the basal 2 segments of the abdomen blue, largely green in the middle and at the apex ; the basal half of the 3rd blue, tinged with purple, the apical dark green. Legs for the greater part purple, the tarsi black. Antennal scape purple, the flagellum black. Wings hyaline, the base of the radial cellule and of the costal cellule smoky, the cloud in the latter being continued into the discoidal. Female.

Head as wide as the thorax, the front thickly covered with depressed white pubescence ; the temples very short, the occiput rounded ; the hair is long, dense and white ; the punctuation coarse and close. Oral region and mandibles black, tinged with violaceous. Pronotum not half the length of the mesonotum ; its sides at the base rounded ; it becomes gradually wider towards the apex. Parapsidal furrows distinct. Scutellum and post-scutellum rounded, the former on a level with the mesonotum. The apex of the post-scutellum broadly rounded. The 1st and 2nd segments of the abdomen are closely, but not very strongly punctured, the 1st with some larger punctures in the middle of the apex ; the 2nd not keeled in the middle. The 3rd is much more strongly and closely punctured, the teeth are long and sharp-pointed ; there are four lateral foveae and one much larger and deeper in the centre ; it being also clearly separated from the smaller

*The descriptions of new species here published, form a portion of a list (with synonyms) of the S.A. Hymenoptera in the collection of the Albany Museum. The publication of this list is held over for the present, as a large amount of material has recently come to hand which has not yet been submitted to Mr. Cameron. S. Sch.

lateral ones ; the central and outer emarginations are larger than the inner lateral : they are rounded, the central being larger and deeper than the others.

Front not depressed ; there is a narrow, deep furrow down the centre ; the keels on the top are narrow, not very distinct, rounded. Allied apparently to *H. monochroa*, Mocs.

*Tetrachrysis dalyana*, nov. sp.

Green, the vertex behind the ocelli—the mark widened behind,—the basal half of the middle lobe of the mesonotum, base of scutellum in the middle, the curved furrows on the centre of the metanotum and the base of the 2nd and 3rd abdominal segments to near the middle indigoblue, the 2nd keeled down the middle from the base to the apex ; the green on the sides of the head, thorax and abdomen is largely tinged with brassy. Wings fuscous violaceous, paler towards the apex. Female.

Length 10 mm.

Grahamstown (Misses Daly and Sole).

Hair on head, pleuræ and legs long, dense and white. Antennal scape brassy green, the basal 2 joints of the antennæ of a duller green. The keel over the front is curved ; in front it is broad and smooth and a few smooth projections run down from it, the central being the widest, longest and most regular. The raised, central part of the face is impunctate. Mandibles green at the base, the rest black, tinged with violet. The centre of the middle lobe of the mesonotum at the base and the apical half are violet-coloured. The 2 curved depressions on the metanotum are deep, wide ; there are 2 stout keels at the base of the middle and one at the apex. There is a distinct keel on the centre of the 2nd segment, extending from the base to the apex ; there is an indication of a keel on the 3rd ; the apical foveæ are large, but not very clearly defined ; the central incision is distinctly smaller than the lateral ; the teeth are distinct.

A broad stout species. It comes close to *T. kloofensis* ; it is larger and may readily be separated by the metanotal oblique furrows not ending in 2 large foveæ.

*Tetrachrysis kloofensis*, nov. sp.

Green, largely tinged with brassy tints, the centre of the vertex behind the ocelli and the centre of the occiput more broadly, tegulæ, the mesonotum at their sides, the middle lobe of the latter, 2 oblique furrows on the metanotum, and the base of the 2nd abdominal segment, indigo-blue, tinged (especially on the mesonotum) with violet. Antennal scape and basal two joints of the flagellum green, the rest of flagellum black. Wings hyaline, tinged with fuscous violaceous, the nervures black. Female.

Length 8 mm.

Brak Kloof. Mrs. G. White.

A broad insect. Front and vertex densely covered with longish grey pubescence; the sides of the face more densely with woolly hair of a brighter, white colour. Front margined above by a stout, waved transverse keel; its centre with a broad, flat, smooth longtitudinal furrow; the sides punctured, more strongly above than below. Face finely closely punctured; there is a smooth space below each antenna. Mandibles dark violet, green at the base. Temples wide, longer than the 4th antennal joint, roundly, but not much narrowed; the occiput is almost transverse. The temples are keeled on the innerside, the keel becoming stouter below, and continued down the outerside of the malar space. Pronotum more than half the length of the mesonotum. The central part of the metanotum is bordered by wide deep oblique furrows, purple in colour; they end in two deep, larger, longer than wide, foveæ. The punctuation on the head and thorax is coarser; on the pleuræ it forms reticulations; below the middle there is a smooth space with 4 narrow vertical keels, of which the posterior is the smaller. Tarsi black. Legs covered with white pubescence. The 1st abdominal segment is more strongly and deeply punctured (especially in the middle) than the 2nd; the latter is keeled to shortly beyond the middle. The apical teeth are short, sharp, the central incision is shorter than the lateral, the foveæ are large, mostly wider than long. The lateral angles of the metanotum are large, triangular, sharply pointed; on the apex of the metapleuræ below is a large, deep depression, longer than wide, counting from above downwards.

*Tetrachrysis soleana*, nov. sp.

Green, the centre of the vertex and occiput, the apical half of the middle lobe of mesonotum and the greater part of the 3rd abdominal segment, indigo blue, the temples, pleuræ and legs largely tinged with brassy tints; the 4th and following joints of antennæ, and the tarsi are black; the basal joints of the antennæ green. Wings fuscous violaceous, paler towards the apex. Female.

Length 6·5 mm.

Brak Kloof. Mrs. G. White.

Frontal depression above bordered by a ⌒-shaped stout keel; the central furrow broad; the sides closely, finely punctured, the punctuation becoming coarser towards the eyes; the vertex is closely rugosely punctured; the part below the ocelli is irregularly longitudinally striated-reticulated; the sides of the front are thickly covered with white pubescence; the pubescence on the rest of the head is short and sparse. Temples roundly narrowed, distinct, as long as the space between the outer ocelli and the eyes. Occiput transverse. The punctuation on the top of the thorax is stronger than it is on the head, except on the pronotum; on the scutellum it is wider, deeper and more reticulated than it is on the mesonotum; on the metanotum it is still deeper and coarser. Metapleuræ smooth above; the base and apex below are finely, closely longitudinally striated; the centre is depressed, and is more irregularly and strongly striated; the lateral angles large, triangular. Abdomen closely and strongly punctured, the 3rd segment more closely than the others; the teeth are short, thin; the central incision not much more than half the length of the lateral. Ventral surface blue.

This species, Col. Bingham tells me, is closely related to one in the Brit. Mus. Coll., named *illionii*, Guér.

*Heptachrysis roberteana*, nov. sp.

Dark green; the ocellar region blue, largely tinged with violaceous and purple; the basal half of the 2nd and 3rd abdominal segments blue; the scape green, basal 2 joints of flagellum blue, the rest of the flagellum and the tarsi black; wings hyaline, the

radial cellule slightly smoky. Abdominal teeth broad, short; the middle incision narrower than the lateral. Female.

Length 6 mm.

Pearston. Prof. Robert Broom.

Upper part of front and vertex closely covered with round deep, clearly separated punctures; the rest of the front much more closely and finely punctured, deeply depressed in the middle above, and with a smooth furrow in the centre; the sides thickly covered with white pubescence. The pubescence on the vertex is short, white and moderately dense. Clypeus with a row of large punctures. Mandibles black. The pubescence on the thorax is white; it is longer and sparser on the metanotum. Pronotum two-thirds of the length of the mesonotum, its sides parallel; its apex somewhat depressed. The punctuation on the scutellum is wider and more irregular than it is on the mesonotum; on the metanotum it is still deeper, sparser, and more irregular, forming almost reticulations; the punctuation on the spines is closer and finer. Propleuræ finely, closely punctured; the punctuation on the mesopleuræ is stronger, the punctures round, deep and more clearly separated. There is a keel or impressed line down the middle of the 2nd abdominal segment; the 3rd is more strongly punctured than the others, and is more thickly covered with white pubescence The apical foveæ are larger and deeper than usual, especially the middle ones, which are fuscous in colour. The 3 incisions hardly form teeth.

*Pentachrysis leira*, nov. sp.

Green, the middle of front, vertex and mesonotum tinged with blue, the basal half of the 3rd abdominal segment indigo-blue, the base almost black; the green is largely tinged with brassy tints; scape of antennæ green, the flagellum and tarsi black. Wings hyaline, highly iridescent. Female.

Length 6 mm.

Head, thorax and legs densely covered with white pubescence. Thorax and upper part of head coarsely punctured. There is a stout transverse keel over the front; it is in the middle, is straight and curves down at the sides,

the lateral branches being thinner than the others. The centre of the frontal depression is closely, minutely, the sides more strongly punctured. Temples longish, roundly narrowed; the occiput transverse. Pronotum more than half the length of the mesonotum, its sides straight. Centre of propleuræ depressed, smooth, the depression forming a large oval. Mesopleuræ coarsely reticulated-punctured; below the middle is a square reticulation, followed by a much larger one below, which is a smaller and a larger one. The punctures on the 1st segment are round and clearly separated; the other two are more closely punctured, the 3rd not so closely at the base as at the apex. The 2 central foveæ are large, wide, deep, the others smaller, indistinct; the outer incisions are wider than the inner.

A Female in my collection from Cape Colony.

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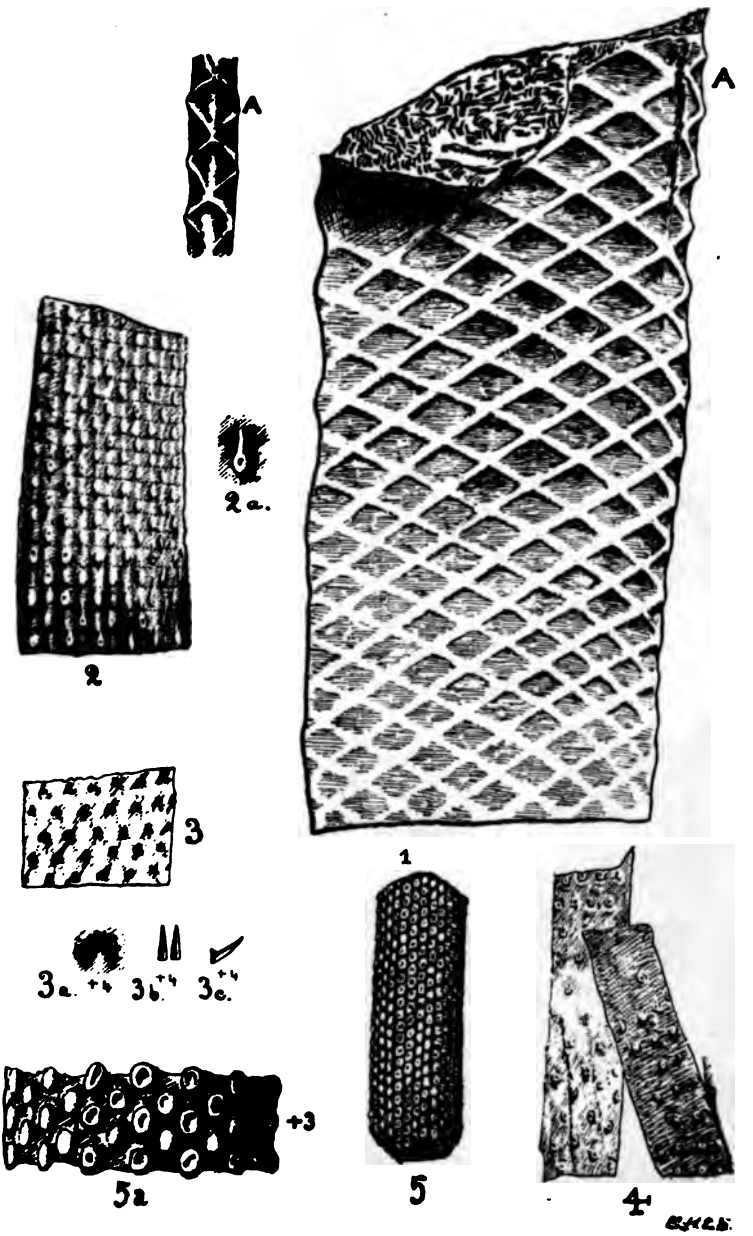
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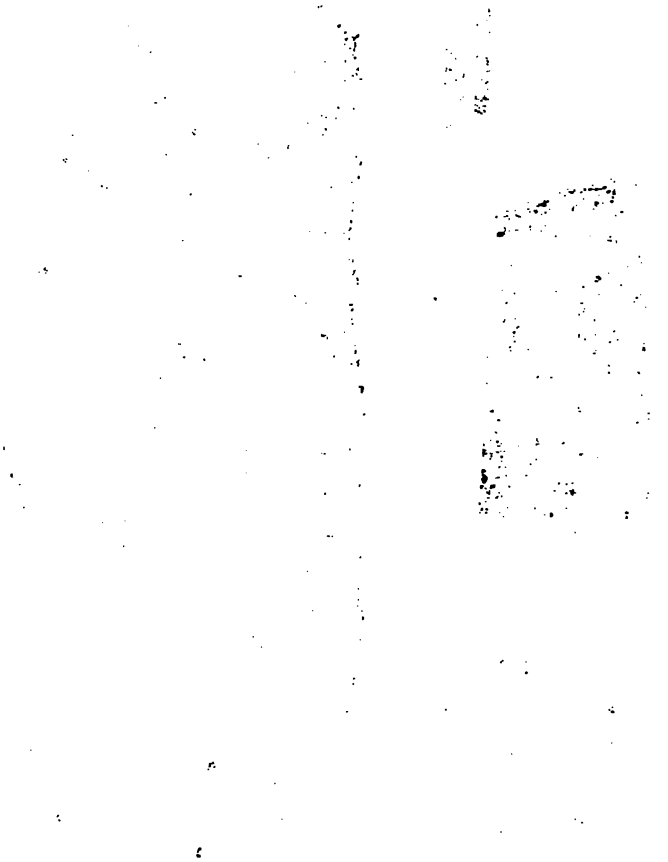

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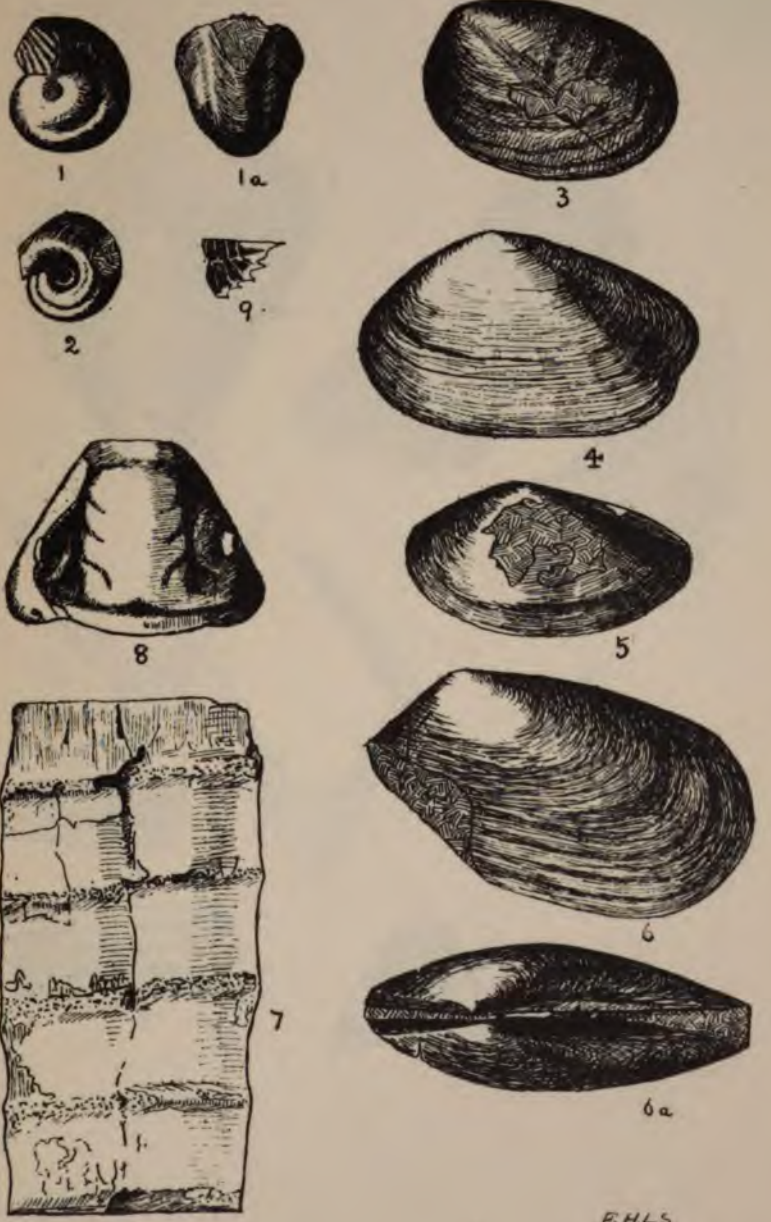
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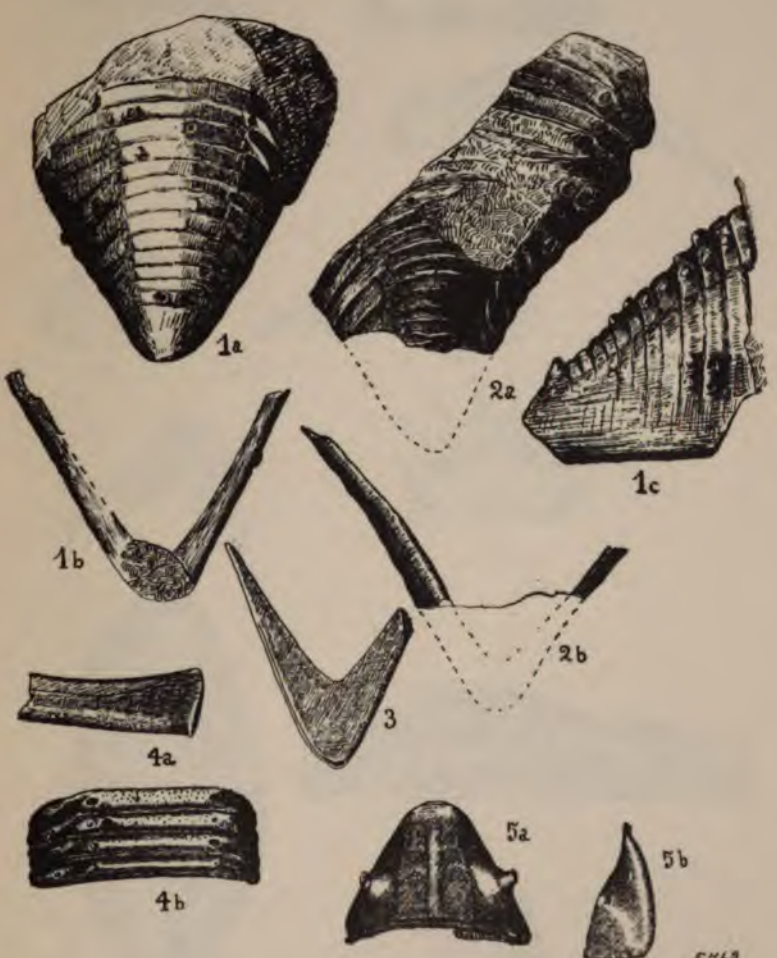
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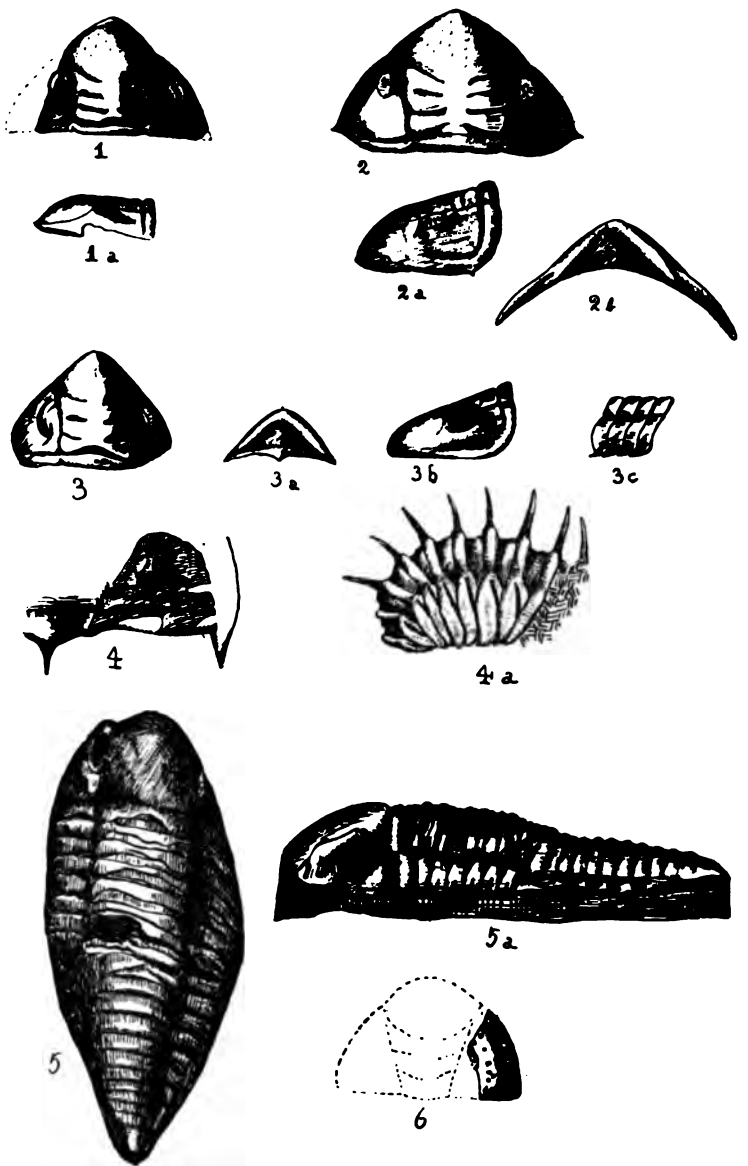
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*Fig. 1.*

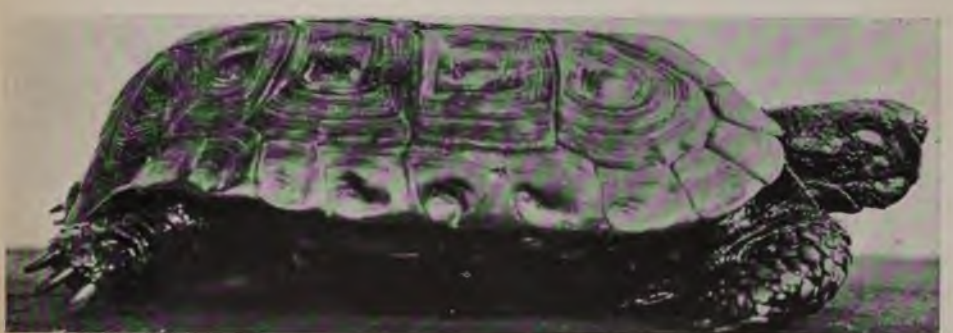
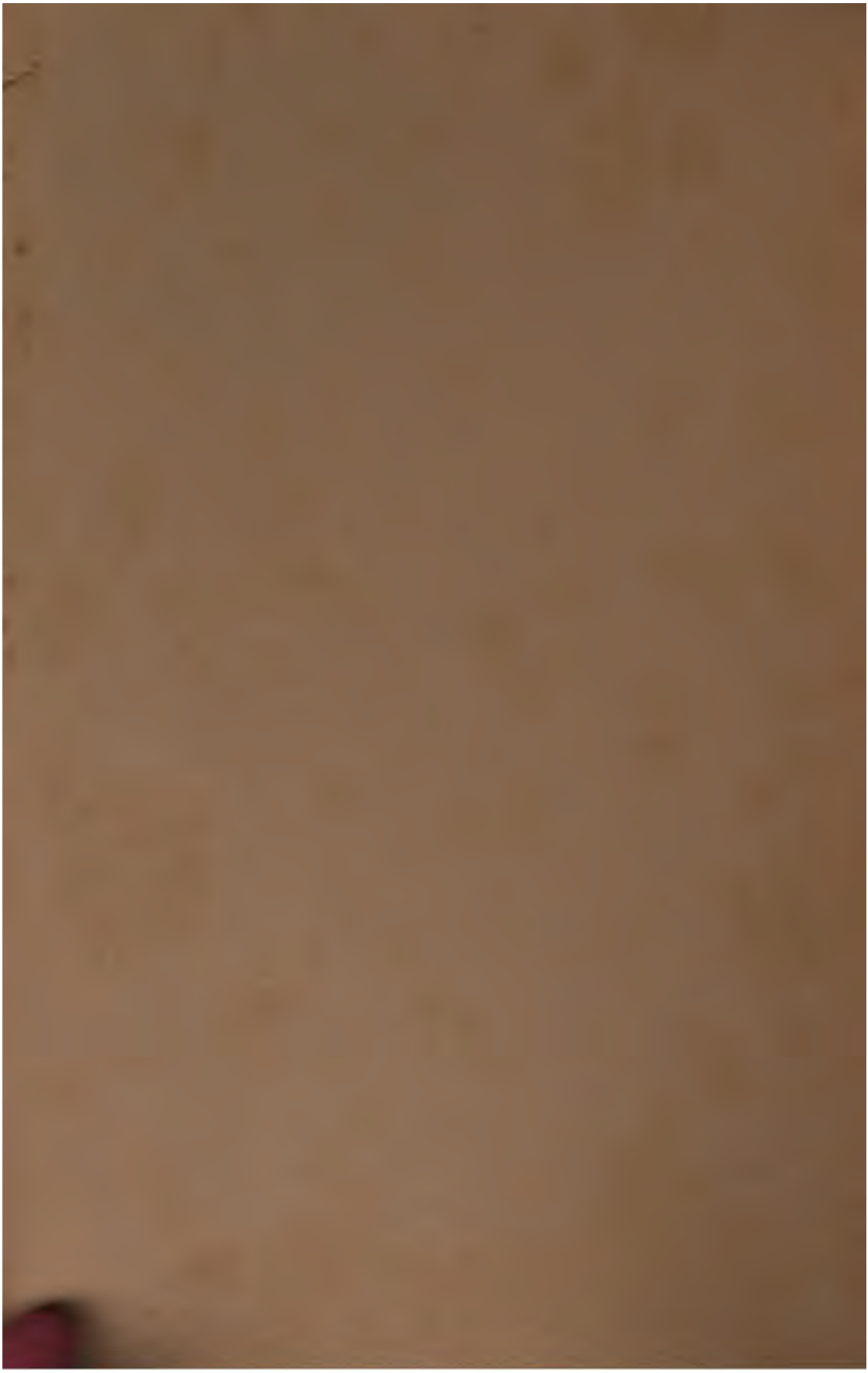


*Fig. 2.*

*Fig. 3.* *Fig. 4.* *Fig. 5.* *Fig. 6.*

*Homopus boulengeri.*



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